ELECTRICAL REVIEW

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Managing Editor : HUGH S. POCOCK, M.I.E.E. *Technical Editor :* W. O. FENWICK, M.I.E.E.
Industrial Editor : J. H. COSENS *Technical Consultant :* C. O. BRETTELLE, M.I.E.E.

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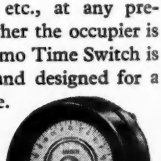

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ELECTRICAL REVIEW

Vol. CXLVII No. 3792 28TH JULY, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Research by the B.E.A.

SEPARATE ORGANIZATION JUSTIFIED

IT may have been thought that the power to conduct research bestowed upon the British Electricity Authority by the 1947 Electricity Act would have been exercised through existing organizations. This is, in fact, one way in which the Authority is proceeding and it is the principal supporter of the Electrical Research Association. But it has considered it desirable, or necessary, to possess research facilities of its own and for this reason has considerably expanded the arrangements which it took over from the former Central Electricity Board. New laboratories have been established at Leatherhead, where the C.E.B. already had some of its equipment. They were officially opened by Lord Citrine recently and are briefly described in this issue.

Avoidance of Duplication

Upon the occasion of our visit Dr. J. S. Forrest, who directs the work of the laboratories, took the opportunity of referring to the genesis of the establishment, which was as long ago as 1932 when the C.E.B. set up a small laboratory at Waddon (Croydon) to investigate high-voltage problems which had arisen in connection with the grid. This was supplemented two years later by a high-voltage insulator testing station at Croydon which is still in use. In addition, field investigations were carried out in the Board's seven districts and resulted in a number of valuable reports.

Dr. Forrest said that it was not their intention to duplicate at the laboratories work which was being carried out elsewhere. Full co-operation would be maintained with other research organizations, including those of manufacturers of equipment. He claimed that they were already making valuable contributions to the settlement of many problems of the industry.

Day-to-Day Problems

Sir Harold Hartley, the chairman of the Electricity Supply Research Council set up by the B.E.A., said on the same occasion that his thirty years' experience in a variety of industries had convinced him that any big organization like the B.E.A. should possess its own research facilities. Such an arrangement enabled those conducting the research to concern themselves with the day-to-day operation of the system and mutual confidence grew up between them and the engineers actually on the job. Problems which were put before the laboratory staff could be dealt with very quickly.

Referring to his Research Council, Sir Harold claimed that its first year's working had proved successful. The success was attributable to the selection of the right kind of men. The members of the Council had a variety of experience covering a wide spread of scientific and engineering subjects. Their function was to suggest lines of investigation and the best places for the study of problems.

Our notes show that the new laboratories are well equipped for the investigation of physical, chemical and electrical phenomena encountered in the generation, transmission and distribution of electricity, in conjunction with the other establishments of the B.E.A. This work is essential if an efficient and trouble-free service is to be achieved. It is important, however, that the co-operation with other bodies referred to by Dr. Forrest should be of the closest character if wasteful overlapping is to be avoided. There must also be a limit to the extent of the investigations to guard against dissipation of effort. During our visit we heard a suggestion that the Authority's ownership of 350 electric vehicles provided an opportunity of investigating battery characteristics with a view to reducing weight. Is not this going rather far afield? What has happened about the Cambridge experiments of E.R.A.?

MIXED BLESSING

Cases of insomnia caused by night silence are referred to by the writer of the *Manchester Guardian* "Miscellany" in commenting on a ban imposed on noisy vehicles during the night hours in a North Italian town. There may, he suggests, be a demand "Give us back our noise." Past experience indicates that there will be no regrets from this aspect when the clatter of London's trams is stilled in a few years' time. In previous conversions the quietest of all road passenger vehicles —trolley-buses—have taken their place. This time, by a change in policy on the part of the transport authority, the contrast will not be so marked. In fact, the relief to one sense will be offset by an infliction on another (by the exhaust fumes). Moreover, the already congested streets will have to carry a larger number of vehicles to accommodate the same number of passengers.

PROTECTIVE TARIFFS

There may be something to be said in favour of protecting an "infant" industry from foreign competition, but how long protective tariffs should be maintained is a matter for consideration. In India an *ad valorem* tariff of 30 per cent was imposed on imported dry batteries to enable home producers to compete with them and, furthermore, imports were controlled. Following an application for the extension of this protection, the Indian Tariff Board made an investigation of the industry. It recommended that, while the tariff should be continued until the end of 1952, the industry should take a number of steps to improve its production and distribution methods and should submit details of its operation and costs to the Board every six months. The Board also recommended (and the Government has accepted the recommendation) that imports of dry batteries should be controlled only as long as foreign exchange considerations made it necessary.

OUTPUT CURVE

Weather changes, holidays and other variable factors cause fluctuations in the electricity demand, yet over all a steady 10 per cent output rise is being maintained. The May increase was 10.6 per cent; that in June 10.9 per cent; and the average for the first half of the year 10.2 per cent. To meet this and narrow the gap between capacity and peak demand 392 MW has been added to the installed capacity since the beginning of the year. Compared with what is required this figure seems disappointing, but it should be borne in mind that the greater part of the new plant each year is brought into commission in the latter half of the year. In the first six months of 1949, for example, 213 MW was added, while the net gain for the whole year was 687 MW.

LOAD SPREADING

It is to be expected that with a gap still existing between anticipated demand and plant capacity, load shedding will have to be resorted to again during the coming winter. The Regional Boards for Industry, in conjunction with the British Electricity Authority and Area Boards, are preparing industrialists for this unwelcome but necessary action, but it is anticipated that conditions will be better than they were last winter. That is, the ability of the Boards to meet demand will be improved, but a great deal depends on Nature. Is it too much to hope for a repetition of the mild conditions of the last two winters?

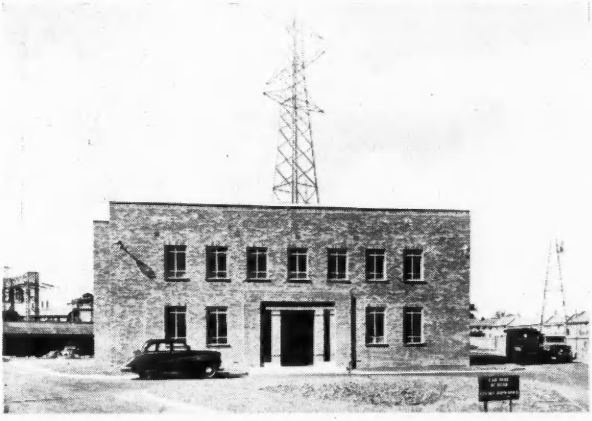
Electricity Supply Research

Inauguration of New B.E.A. Laboratories

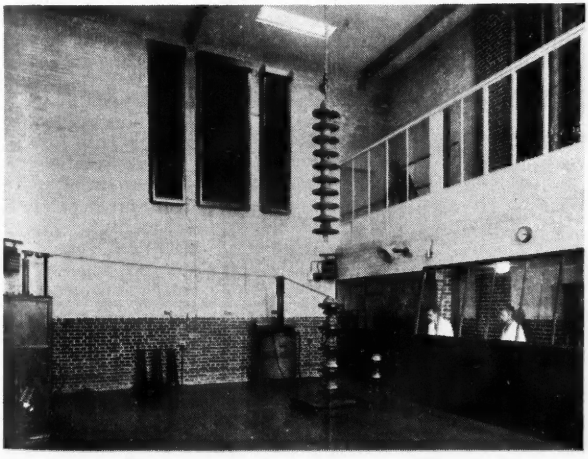
ON 15th July Lord Citrine, the chairman of the British Electricity Authority, formally opened the research laboratories which the Authority has set up at Leatherhead, Surrey. The new laboratories have developed from a nucleus provided by the former Central Electricity Board which owned the site near a 132 kV transforming station and transferred some of its testing equipment there during the war.

Research is given special stress in the Electricity Act, 1947, under which the B.E.A. operates, and immediate attention was given by the Authority to the expansion of the facilities at Leatherhead to enable it to undertake investigations into a variety of problems associated with the generation, transmission and distribution of electricity. A new building was begun in June, 1948, and towards the end of the following year the offices and most of the laboratories were in use.

It is emphasized by the Authority that its research work is not a duplication of



B.E.A. Laboratories at Leatherhead, showing the test tower in the background



High-voltage laboratory with a 150 kV test in progress

that being carried out by other bodies and that close co-operation is maintained with these organizations. Organization is classified in seven subject sections: Transmission and distribution; electronics and instruments; generation (special problems); mechanical engineering; physics; chemistry; and photography.

A large proportion of the transmission and distribution section consists of investigations on insulators and the study of insulating materials. There are high- and low-voltage laboratories associated with the h.v. experimental line (250 to 500 kV between phases), described in our issue of 3rd March last, and the former Central Electricity Board's insulator testing station at Croydon.

In the h.v. laboratory equipment is available for providing impulse voltages up to 1,400 kV peak, power-frequency voltages up to 250 kV r.m.s., and d.c. voltages up to 200 kV from selenium rectifiers. Impulse and power-frequency waveforms can be recorded by cathode-ray oscillographs and a Schering bridge enables power factor measurements up to 250 kV r.m.s. to be made. A toughened glass screen protects the operator and all instrument dials and printers have luminous markings for reading under ultra-violet light when the laboratory is darkened. An observation gallery above also has a toughened glass screen. Electrical interlocking prevents entry to the high-voltage area when the power is on.

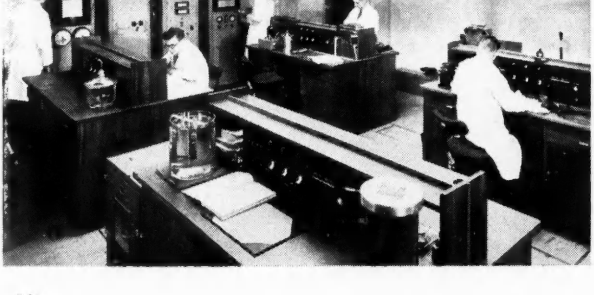
A variety of investigations and measurements are conducted in the low-voltage laboratory, including the recording of electrical conditions on the grid system under normal operation and during faults. Significant meteorological factors are also recorded to enable the correlation between power system load and weather conditions to be studied.

The h.v. experimental line consists of two 1,200 ft spans of conductor supported from 120 ft wide steel gantries. The arrangements provide for the varying of the phase separation, the disposition of the earth wires and the spacing of the two conductors comprising each phase. The investigations cover corona power loss and insulator leakage in various weather conditions, radio interference and mechanical performance. Insulator life tests are carried out at 85 kW at the Croydon station.

Special instruments are developed and new electronic techniques are adapted to power system operation in the electronics and instruments section. Among the subjects being dealt with there are v.h.f. radio communication, radio interference, thunderstorm recording, fault recording, system protection and load control. Instruments for field tests are also largely the responsibility of the section. The equipment includes various patterns of oscillographs, harmonic analysers, frequency meters, noise and pressure measuring apparatus, time interval meters and a range of standard instruments for various purposes. The supply arrangements give d.c. and a.c. on every bench and a 2,000 c/s supply is also available.

Special problems in connection with generation are dealt with in the recently established generation section; they include such matters as vibration, rotor winding failures and the precipitation of moisture from cooling towers. The last is receiving most attention at the moment and an experimental cooling tower has been erected at Croydon in which the water and air rates can be varied and water carried out by the air can be collected

The low-voltage laboratory showing the instrument racks for recording the power system conditions and meteorological data

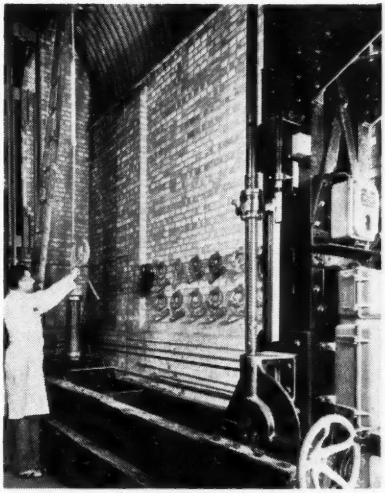


and measured. Tests are made, under carefully controlled conditions, on various designs of packing, water distribution systems and eliminators. Work is also in progress on methods of measuring precipitation from fuel-scale cooling towers and for determining their performance, especially in connection with air flow.

The mechanical engineering section is responsible for ensuring that all new types of overhead line joints are in accordance with specification before they are accepted for service. It measures the ultimate tensile strength of conductors and joints, assesses conductor deterioration, and tests materials generally. The equipment includes a machine for measuring the ultimate mechanical strength of conductors and joints up to 24,000 lb. The section has a well-equipped workshop for the production of prototype apparatus designed in the laboratories.

General physical problems arising out of the work of the other sections are handled in the physics section. Investigations are in progress into the behaviour of semi-conducting ceramic glazes at low temperatures and a study is being made of the literature on thermal storage and the fuel cell. An important part of the section's work is the provision of X-ray photographs to other sections and from these useful information has been gained about overhead-line joints, condenser bushings, traction batteries and other components. The radiographic laboratory has a 140 kVp X-ray equipment set up in a room with sheet-lead floor and doors and barium concrete block walls. Operation is from a separate control room with a lead-glass observation window.

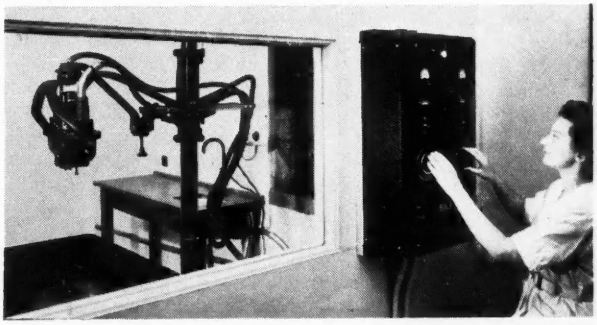
The work of the chemistry section is largely complementary to that of the other sections. The usual services are provided in the laboratory and the equipment includes apparatus for colorometric analysis, pH measurement, flash-point determination and the measurement of conductivity. Work is at present in progress on the possible correlation between impurities in aluminium conductors and the rate of deterioration in service. The laboratory is also assisting in international research on oil oxidation, instituted by C.I.G.R.E.



Physics Section: 24,000 lb testing machine in use to determine the ultimate mechanical strength of a compression joint and "snail" clamp assembled on s.c.a. conductor

The photographic section has up-to-date equipment for providing service to other sections and applying special techniques to experimental work. There is a spacious conference room and reference library equipped with projection apparatus.

Radiographic equipment seen through the control room window



Reports from the laboratories are regularly issued to the headquarters staff, divisional controllers and Electricity Board chief engineers and quarterly reports summarizing work in progress are circulated throughout the Authority. Since April, 1948, over eighty reports have been produced.

Advice and recommendations regarding the nature and scope of the research which the B.E.A. should undertake are put forward by the Electricity Supply Research Council established about a year ago. The chairman of this Council is Sir Harold Hartley and the members include a number of eminent scientists and engineers of the Authority and Electricity Boards. The secretary is Dr. J. S. Forrest, who is in charge of the laboratories.

The architects for the building were Farmer & Dark; the contractors were Thomas Lowe & Sons. High-voltage equipment was supplied by Ferranti, Ltd., and the h.v. line equipment by British Insulated Callender's Cables, Ltd.

At the opening of the laboratories: Lord and Lady Citrine, Sir John Hacking, Dr. J. S. Forrest and Sir Harold Hartley

Electricity Supply in Europe

Activities of U.N.I.P.E.D.E.

ECONOMIC and engineering aspects of electricity supply, particularly international transfers of power and the compilation of statistics, are the main concern of the Union Internationale des Producteurs et Distributeurs d'Energie Electrique (U.N.I.P.E.D.E.) which was founded in 1925 with a permanent secretariat in Paris. Its active members are representative supply organizations (including those which are nationalized, but not Government bodies) in Belgium, Czechoslovakia, Denmark, France, Great Britain, Holland, Hungary, Italy, Norway, Poland, Portugal, Sweden and Switzerland. There are in addition non-voting adherent, associate and corresponding members.

Nine study committees are concerned with (thermal, water power, combined steam and electricity) generation, means of increasing the capacity of networks, international interconnection, tariffs, characteristics of fluorescent lamps, statistics and the electrical equipment of under-developed countries. The Area Boards of Britain are represented on all but the last-mentioned committee.

The last Congress was in Brussels in 1949; it is to be held every third year in future. The 400 engineers who attended included 14 from Britain. The Congress report, in two volumes of 800 pages containing 85 papers and the discussions, in French, is obtainable from the U.N.I.P.E.D.E., 12, Place des Etats-Unis, Paris, 16e, France, for 8,000 Fr. francs (about £8), or a 200-page brochure containing the discussions only for 2,000 Fr. francs (£2).

A copy of the report is available in the B.E.A. library, Great Portland Street, London, W.1, as is also the quarterly journal "Circulaire Periodique," subscriptions for which (1,500 Fr. francs, about 30s) should go to the Paris address of the organization.

R.E.C.M.F. Exhibition

THE eighth annual private exhibition of British components, valves and test gear for the radio, television, electronic and telecommunication industries will be held in the Great Hall, Grosvenor House, Park Lane, London, W.1, from 10th to 12th April, 1951. The exhibition is organized by the Radio and Electronic Component Manufacturers' Federation, 22, Surrey Street, Strand, London, W.C.2.

VIEWS on the NEWS

By REFLECTOR

IT was suggested in a recent issue of *The Crabtree* (J. A. Crabtree & Co., Ltd.) that the term "electrical accessories" for switches, plugs, lamp-holders, and the like, was unsatisfactory, and, in fact, inaccurate. An improved description was called for and a number of writers have put forward proposals. One suggests "electrical essentials" or "electrical control components," but the majority of correspondents, it is said, favour "electrical wiring components." I suppose that this is as descriptive a term as can be devised, but it might be shortened by taking the "electrical" for granted.

★ ★ ★

British electrical developments used to get rather scant attention in the American Press—at least, that was my impression. I am glad to see that more interest is now being taken in our activities, and the British Electricity Authority's proposed 275 kV super-grid is given pride of place in a recent issue of the *Electrical World*. In another issue construction work on "Britain's new power station" is illustrated—perhaps it should be mentioned that there are others besides Croydon. One photograph depicts the 230ft high cooling towers, each of which, the caption notes, "holds" 2,225,000 gall of water. They do look something like giant beakers, of course.

★ ★ ★

Last week I referred to the controversy in Scotland over the extra charge made for providing a supply where electric cookers and wash boilers are not installed. The question has now cropped up at Bristol, but in this case the South Western Electricity Board apparently only asks that the Corporation should install the requisite points to allow tenants to have a free choice. Otherwise, if electricity is to be used only for lighting, the Board requires a substantial contribution towards the cost of the work. It is reported that as neither alternative was agreed to, the Board stopped mains laying on two estates, but the work was later restarted. Expressing regret that the Board "had not shown a better spirit," the chairman of the Housing Committee said that he, for one, could not see the sense of being compelled to put in points for immersion heaters and cookers, duplicating the gas services, when people might not want them. Strangely enough, the report goes on to say "A petition from tenants asking for immersion heaters was rejected after the cost of each heater was placed at £16 10s." There does not seem much doubt about what people want.

★ ★ ★

At a meeting of the Southern Electricity Consultative Council mention was made of objections by consumers to the inspection of their premises as a preliminary to the introduction of a new tariff. The deputy-chairman (Alderman E. W. B. Gill) is reported to have said that at Bournemouth most complaints seemed to have come from retired generals and colonels. This is not surprising, I suppose, for in the matter of inspections they have no doubt been on the other side hitherto.

★ ★ ★

Methods of selecting members of the Consultative Council were discussed at the same meeting. Alderman Gill said that there was a feeling in some areas that members should be elected by the consumers. He did not think that feasible. I think that the Alderman could have been more positive. In the first place who would select the candidates? And how many would be selected? And when they were, would there be all the canvassing and other activities accompanying a popular election? No! there are limits beyond which democracy must not be stretched.

PERSONAL and SOCIAL

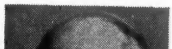
News of Men and Women of the Industry

THE South Western Electricity Board has appointed **Mr. R. H. Upton,** M.Eng., M.I.E.E., A.M.I.Mech.E., as district manager, East Devon, in the Devon Sub-Area, in succession to **Mr. H. F. G. Woods,** B.Sc., M.I.E.E., M.I.Mech.E., who is retiring after nearly forty-five years in the electricity supply industry.

Mr. Woods graduated at University College, London, and after a post-graduate course with the British Thomson-Houston Co., Rugby, joined the Southend-on-Sea Corporation electricity undertaking as junior engineer. After varied experience of public electricity supply work he became borough electrical engineer and manager of Torquay in 1919. In 1929 he was appointed technical adviser to Whitehall Securities Corporation, Ltd., and engineer and general manager to its newly formed electricity supply companies of the Exe Valley group. When this undertaking vested in the South Western Electricity Board, Mr. Woods became senior executive officer, Exe Valley, and in July last year he was appointed to the position of district manager, Exe Valley and East Devon.

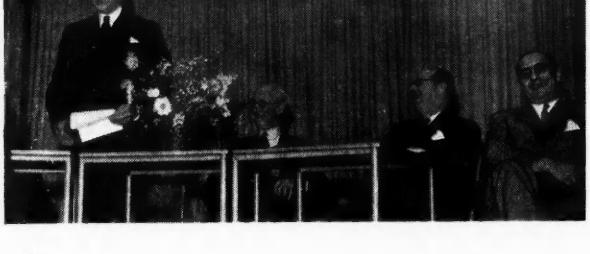
Mr. Upton took his degree at Liverpool University, and became a student-apprentice with Standard Telephones and Cables, Ltd. After three years with the Yorkshire Electric Power Co. as junior engineer, he held positions with York, Ealing and Ipswich Corporation Electricity Departments, and in 1946 was appointed chief electrical engineer to Plympton R.D.C., becoming senior executive officer, Plympton, under the South Western Electricity Board. In 1949 Mr. Upton was appointed district engineer, Plymouth.

Dr. R. G. Jakeman, D.Sc. (Eng.), chief designer in the engineering department of the General Electric Co., Ltd., at Witton, is retiring at the end of the current month. Dr. Jakeman joined the design department at Witton forty-three years ago and was appointed chief designer in 1933. In this capacity he has been responsible for the electrical design of a.c. and d.c. machines of all types, and at one time was particularly concerned with the development of rotary and motor convertors. He is a member of the Institution of Electrical Engineers and of the American Institute of Electrical Engineers, and has served on various technical committees, including those of B.E.A.M.A., B.S.I. and E.R.A.



Dr. R. G. Jakeman

At the works of W. T. Glover & Co., Ltd., Trafford Park, on 20th July, the chairman of the company, Mr. T. H. Martin-Harvey, supported by Messrs. P. V. Hunter, W. C. Handley, directors, and Mr. D. T. Hollingsworth, the general manager, made a presentation to **Mr. Harry Allcock,** M.I.E.E., M.I.Mech.E., M.Amer.I.E.E., to mark his fifty years with the company. Mr. Allcock has been closely connected with the development of electrical engineering for the past fifty years, and was the first electrical engineer of the Trafford Power & Light Supply Co. As chair-



Mr. H. Allcock speaking on the occasion of a presentation marking his fifty years' service with W. T. Glover & Co., Ltd. On the right are Mr. Martin-Harvey, Mr. W. C. Handley and Mr. D. T. Hollingsworth

man of the Decimal Association he gave evidence before the Royal Commission on Decimal Coinage, whose report was published in 1920. For the past thirty years he has acted as export manager of the company. He has been a vice-president of the British Engineers' Association and of the Federation of British Industries, a director of the Manchester Chamber of Commerce, and a member of the Executive Council of the British Chambers of Commerce.

Mr. S. Blackley, chairman of Turnbull & Jones, Ltd., the New Zealand electrical engineering and merchandising company, has recently arrived in this country for a three-month stay. Mr. Blackley is also a director of Waygood-Otis (New Zealand), Ltd., a member and former chairman of the Hutt Valley Electric Power Board, a member of the Town Planning Board of New Zealand, and a member of the executive committee of the Electric Power Boards' Association of New Zealand. His address is c/o Turnbull & Jones, Ltd., Leith House, 47, Gresham Street, E.C.2.

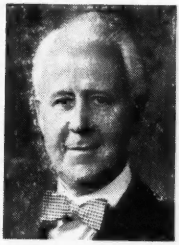
An informal dinner was held in the Parkway Hotel, Leeds, by representatives of some of the leading manufacturers to bid farewell to **Mr. S. R. Siviour,** chief engineer, Yorkshire Electricity Board, on the occasion of his retirement. Mr. W. Plumb (English Electric Co., Ltd.), in a short address, paid tribute to Mr. Siviour's work on behalf of all the manufacturers, and presented him with two engraved silver serviette rings.

Lt.-Col. Sir John H. M. Greenly, K.C.M.G., C.B.E., M.A., has retired from the chairmanship of Babcock & Wilcox, Ltd., but will continue as a member of the board. **Mr. W. L. Fraser,** C.M.G., has been elected to the board of the company and succeeds Sir John as chairman.

Sir John Greenly has been an outstanding figure in the engineering industry for many years. He became a director of Babcock & Wilcox in 1929, was appointed deputy chairman in 1932, and chairman in 1937. He is also a director of the Power Securities Corporation, Ltd., the Cape Asbestos Co., Ltd., and the Phœnix Assurance Co., Ltd. His activities outside company affairs have been numerous. Among them may be mentioned his past-presidency of the Institutes of Fuel and Metals; he is a Fellow of both Institutes. Sir John was also chairman of the British Non-Ferrous Metals Research Association from 1937 to 1949, a past-president of the Institution of Engineering Inspection, and president of the Combustion Appliance Makers' Association (Solid Fuel) from 1938 to 1946. He was a member of the Fuel Research Board from 1942 to 1947, and of the Fuel and Power Advisory Council from 1944 to 1946.

Mr. Fraser's main association is with Helbert, Wagg & Co., Ltd., the investment banking house, of which he is deputy chairman. He is also chairman of Thomas Tilling, Ltd., and deputy chairman of the Atlas Assurance Co. In the 1914-18 war,

Sir John Greenly



Mr. W. L. Fraser

Mr. Fraser served in the Army in France, Gallipoli and Egypt. From 1939 to 1945 he worked at H.M. Treasury, where he was in charge of a Division which handled the financial arrangements with the various Allied Governments domiciled in London. He recently resigned from the joint deputy chairmanship of Tube Investments, Ltd., but continues in close and friendly association.

The Engineers' Guild has appointed **Mr. Bryan Donkin,** B.A. (Cantab.), M.I.E.E., as chairman of the Executive Committee, and he has relinquished the post of honorary treasurer, his successor being **Mr. L. S. Atkinson,** M.I.Mech.E., M.I.E.E.

Mr. D. G. Denoon, who is joint publicity manager, British Insulated Callender's Cables, Ltd., has been elected chairman of the B.E.A.M.A. Publicity Committee. Mr. Denoon has been intimately connected with technical publicity in the electrical industry since 1934 when he became publicity manager of Callender's Cable & Construction Co., Ltd. Having been trained as an engineer and after serving in the R.A.F. during the last part of the first world war, he first joined the Callender Co. in 1924. At the merger resulting in the formation of British Insulated Callender's Cables, Ltd., in 1945, Mr. Denoon became joint publicity manager of the B.I.C.C. group with responsibility for public relations, printed publicity and press advertising. Mr. Denoon is a Fellow and national council member of the Incorporated Advertising Managers' Association.

The General Electric Co., Ltd., has appointed **Mr. H. D. McGough,** manager in the Republic of Ireland. Mr. MacGough joined the G.E.C. in 1915 and spent a year

at the company's head office before his appointment as manager of the Osram Lamp Department in Belfast. In 1922 he joined the Dublin branch of the company as assistant to the late Mr. W. A. Mombrun and took charge of various departments there. Mr. McGough is hon. organizer and hon. secretary of the local Centre of the E.I.B.A.

Mr. W. N. Carey, Bolton District, North Western Electricity Board; **Mr. W. M. Pitcher,** Bungay District, Eastern Electricity Board; and **Mr. A. Brown,** Stoke District, Midlands Electricity Board, have been awarded the sales engineers' diploma of the British Electrical Development Association. This is the first examination held since the war.

Ekco-Ensign Electric, Ltd., has appointed **Mr. V. Oliver** as representative covering certain Western London districts and the county of Middlesex. He will operate from the company's London office at 5, Vigo Street, W.1.

Earl de la Warr has been appointed an additional director of the Brush Electrical Engineering Co., Ltd.

Mr. F. R. Moberly, A.C.A., secretary to Richardsons, Westgarth & Co., Ltd., has been elected to the board.

Over 400 guests attended the speech day of the **Royal Commercial Travellers' Schools** on 15th July, when the chairman of the Board of Management, Mr. J. Freeman Dunn, took the chair, and announced with regret the absence through illness of Lt.-Col. M. W. Batchelor (president of appeal for 1950). Among those present were Mr. Leslie Gamage (president of the Schools) and the Hon. Mrs. Leslie Gamage (member of the Board of Management), who presented the prizes.

More than 1,000 workers of **Oldham & Son, Ltd.,** of Denton, Manchester, spent a day at Blackpool on 8th July as guests of the company. Each employee received an envelope containing a souvenir programme, railway and meal tickets, admission tickets to various places of amusement, and 12s 6d to spend. Mr. J. Oldham, O.B.E., J.P., chairman and joint managing director of the company, was present, with Mr. S. J. Wrigglesworth, director and general manager, and Mr. W. Elkin Platt, the company's legal adviser, who was recently appointed to the board. Lunch was served at the Winter Gardens, when a civic welcome was given by the Mayor and Mayoress of Blackpool. Mr. Wrigglesworth, who presided at the lunch, announced a new pensions scheme shortly to come into operation, which would provide tax-free cash grants for all Oldham workers reaching retirement age with ten years' continuous service to their credit. Mr. Oldham, in the course of his address, spoke of the company's activities overseas.

From its annual dinner-dance at Liverpool and its golf competition at Southport, the **I.E.E. Mersey and North Wales Centre** has raised £330 for the Homes Fund of the Incorporated Benevolent Fund of the Institution.

On 8th July the annual outing of **F. Westerman (Wholesale), Ltd.,** was held, about sixty members of the staff and friends visiting Clun, in Shropshire. After the annual sports, at which the "Welec" trophy was won by the Engineering Section, the party had tea at Tenbury Wells, where later there was dancing and other entertainment.

OBITUARY

Sir Harry Gilpin, whose death occurred on Monday last at the age of 74, was the leader of the mission which visited Canada in 1948 to investigate the possibilities of selling United Kingdom heavy engineering plant in that country.

WILLS

Sir James Blacklock Henderson, D.Sc., LL.D., M.I.E.E., F.Inst.P., Professor of Applied Mechanics at the Royal Naval College, Greenwich, 1905-20, previously lecturer in electrical engineering and university assistant in engineering at Glasgow University, who died on 7th April last, intestate, left £47,532 gross (£47,128 net).

Mr. R. G. J. Booth, late secretary of Globe Telegraph Co., and assistant investment manager of Cable & Wireless, Ltd., who died on 14th March last, left £18,481 gross (£18,278 net).

Mr. Vernon Hope, J.P., chairman and managing director of Parmiter, Hope & Sugden, Ltd., who died on 6th December last, left £157,990 gross (£150,344 net).

Mr. C. M. Read, for many years district engineer of Pirelli-General Cable Works, Ltd., in South-east England and East Anglia, who died on 17th March last, intestate, left £1,276 gross (£1,171 net).

Mr. W. Milne, director of the British Driver-Harris Co., who died on 26th March last, left £6,370 gross (£3,545 net).

Mr. H. G. Redfern, superintendent of the Chadderton and Greenhill generating stations, Oldham, who died on 17th March last, intestate, left £3,517 gross (£3,356 net).

Mr. C. J. Macfarlane, electrical engineer, who died on 28th February last, intestate, left personal estate in England and Northern Ireland valued at £3,070.

PARLIAMENTARY NEWS

B.E.A. Report Debated

By Our Special Reporter

THE progress of the electricity supply industry came under review in the House of Commons on Tuesday last, when the Minister of Fuel and Power (Mr. Noel-Baker) moved that the House take note of the first annual reports and statements of accounts of the British Electricity Authority and of the Area Electricity Boards; of the report of the Minister of Fuel and Power for the period 1947-49; and of the annual report of the North of Scotland Hydro-Electric Board for 1949.

Mr. Noel-Baker said that the British Electricity Authority and the Boards had had to consolidate 558 separate undertakings and amalgamate the workers and staff, unify the finances, and keep the services running without interruption. There was trouble with the programme of generating plant but the construction of power stations was now progressing well. There was also worry about load spreading and load shedding, but it was hoped that load spreading next winter would be less onerous.

The industry was expanding at a prodigious rate. It was predicted that in 1970 there should be 30,000 MW of generating plant if the national demand was to be met.

The B.E.A. had a programme over the next five years for 47 new stations and 35 extensions. On 61 of these projects civil engineering and building had begun, and on 48 they had started erection of the plant. This year capital investment amounted to £102 million. There would be increasing economies in transmission and distribution now that the whole system could be organized as a single national unit. The supergrid which some day might transmit current at 300,000 V or more might result in more power stations being situated at the pit-head

The loss of electricity through unsuitable fuel had been cut from 3.3 per cent in 1946-47 to 1.2 per cent in 1948-9, equivalent to about 250 MW. It was estimated that the overall national efficiency in the use of coal was 18 per cent, 82 per cent of the heat value being wasted. If we could raise that average to 28 per cent we should save 60 million tons of coal a year. Since vesting date the efficiency of the stations had risen from 20.86 to 21.85 per cent.

There still remained the basic problem of the peak, and the need for a better spreading of the load throughout the night and day. Experiments were proceeding with the storage fire or radiator and electric vehicles would provide a good night load. In every branch of electricity there was great scope for scientific research. Whatever the future might hold the B.E.A. had made a smooth and satisfactory start in its arduous but vital task.

Mr. Geoffrey Lloyd, for the Opposition, said that the Minister had made what he thought was a "notably unaggressive" defence of the B.E.A.

Coal supplies continued to provide serious problems. The deputy chief engineer of the Authority had stated that the fall in calorific value of the coal received had involved an extra payment of £4 million a year. In addition the ash content had increased and the cost of disposal, he estimated, was £840,000 a year. In the future there would be an increase in transport charges, involving an extra cost of £1½ million for rail transport and £250,000 for canal transport, and an increase in the cost of capital equipment.

Sir Henry Self, dealing with the period 1955-56, had said that there was serious danger that in face of rising costs the Authority might not be able to maintain a balance without a serious disturbance of the level of retail tariffs, and that unless the consumers or communities concerned made some special contribution towards the extra cost of development in rural areas this development could not go on rapidly in view of the investment cuts imposed by the Government.

One of the most disgraceful episodes dealt with in the report was the imposition of the Clow differential for which the Minister's predecessor was responsible. The Minister must be careful about the way he interfered with the action of the Authority.

Mr. Tomney (Labour) said it was essential that electrical equipment and appliances should be made as cheaply as possible, and the Minister ought to consult with the Authority and manufacturers of equipment to see whether an arrangement could be reached for a scaling down of retail prices.

Mr. Pickthorn (Conservative) questioned the Authority's accountancy methods.

Mr. E. Roberts (Liberal) said that the B.E.A. had been inept in the way it had presented the hydro-electric proposals for Wales. Welsh resources would never be satisfactorily developed until there was an Electricity Board for Wales.

Mrs. Castle (Labour) declared that the electricity and other nationalized industries had been battling against a propaganda campaign of distortion carried on by the Press and Conservative M.P.s.

Lord Malcolm Douglas-Hamilton (Conservative) expressed anxiety about the future of the hydro-electric schemes in the Highlands of Scotland.

Mrs. White (Labour) said the seven or eight schemes for hydro-electric generation in North Wales could be developed separately, and she urged the authorities not to embark on the most controversial schemes at the outset, but to give the people of Wales a more adequate opportunity of judging whether they wished to have that kind of development in the Snowdonia area.

Mr. Crouch (Conservative) said that installation costs in the countryside were very much higher than they need be. The electrification of the whole of the southern region would require a capital expenditure of £4 million, and the interest on that sum spread over all consumers would amount to a surprisingly small sum.

Mr. Pannell (Labour) said that the structure of salaries in the B.E.A. was wrong. The ceiling set for Cabinet Ministers should be the ceiling set for the chairman of the B.E.A.

Mr. F. J. Erroll (Conservative) said that an excessive administrative bureaucracy had been built up. Most of the capital cuts ordered by the Government were to take place on the distribution side, not on the generating side. That was a faulty balance because the distribution side was heavily overloaded. He warned the Government that there was every possibility of a number of disasters through heavily overloaded sub-stations and cables.

He maintained that at least 10 per cent could be pruned off the cost of each new power station by erecting serviceable buildings as economically as possible.

Mr. Fort (Conservative) contended that industry was at present subsidizing the domestic consumer. Unless the Government submitted a new price policy to the Authority industrial productivity would not be improved.

Mrs. Middleton (Labour) said that the Consultative Councils were far too remote from the consumers.

Lady Megan Lloyd-George (Liberal) said there was an urgent need to provide electricity for the villages, agriculture and industry in North Wales, but she questioned whether the plans of the B.E.A. were the best that could be devised. The Government should reject these schemes as uneconomic, extravagant and destructive of one of the most glorious parts of the country.

Sir Arnold Gridley (Conservative) said that there were too many people engaged at the top in the electricity industry. The tempo of development throughout the country had been definitely slowed down. In various parts of the country the mains were heavily overloaded at certain times of the day and some transforming stations were running so hard that the men operating them were hourly afraid of explosions.

Replying to the debate, Mr. Robens said that prices would have risen a great deal more but for nationalization. The Opposition had failed to notice that at the takeover there were 150 undertakings making losses totalling £7 million a year.

It was not intended at present that there should be a standard charge for electricity throughout the country, but B.E.A. intended to get down to one or two tariffs for an Area. The Anglesey scheme would have to come before Parliament. There was a good deal of sympathy for maintaining the beauty of Snowdonia.

The motion was agreed to.

Telephones Installed

Mr. Ness Edwards informed Mr. Carson that the number of telephones installed at 31st March, 1950, was 5,171,491.

Guards for Electric Fires

Mr. Llewellyn asked the Minister of Works whether his attention had been drawn to the large number of accidents caused by unguarded electric fires to old people and children; and whether he would consult with the trade with a view to ensuring that guards might be available to purchasers of electric fires.

Mr. Stokes said that the question of accidents in the home was being examined by an Inter-Departmental Committee and he would consider an approach to the trade in the light of any recommendations the Committee might make.

Capital Expenditure Cuts

Mr. Peter Thorneycroft asked the Minister of Fuel and Power when he expected to complete the consultations that he was now having with the regional electricity authorities on the subject of the cuts in capital expenditure.

Mr. Noel Baker said that responsibility for co-ordinating the programmes of Area Electricity Boards rested with the British Electricity Authority. His responsibility in regard to the electricity investment programme was a general one; he was in continuous consultation with the British Electricity Authority, and he now awaited the Authority's conclusions resulting from its consultations with the Area Boards.

OVERSEAS ELECTRICAL TRADE

Exports Higher in the First Half of Year

THANKS mainly to increased sales of generators and "other electrical machinery," exports of electrical apparatus and machinery during the first half of the year at £65,039,347 showed an increase of £1,687,052 compared with the corresponding period of 1949. The shipments of generators rose from £6,447,594 to £7,775,007 (of which Russia took £3,068,814 compared with £2,608,829) and those of "other electrical machinery" from £8,594,138 to £10,811,156, the best customers being South Africa £2,413,781 (£1,633,172) and India £1,955,372 (£1,604,901). On the other hand exports of electrical goods and apparatus declined from £40,847,373 to £40,170,498, while those of motors fell from £5,350,147 to £4,179,176.

Government policy in South Africa is reflected in the decline of that country from first to third place among buyers of electrical goods and apparatus, its purchases amounting in value to almost exactly half of those for January-June, 1949—£3,272,922 compared with £6,469,297. Australia is now the best customer, taking goods to the value of £6,396,934 (£4,384,240), India with

TABLE I—ELECTRICAL EXPORTS

Class	June, 1950	June, 1949
	£	£
Telegraph and telephone cables and wires (submarine)	125,179	118,956
Ditto, not submarine	664,937	558,886
Wires and cables, cotton, silk or artificial silk insulated	33,401	89,066
Ditto, enamel, glass or asbestos insulated	69,955	103,757
Ditto, paper insulated	540,879	800,116
Ditto, rubber insulated	362,766	484,661
Ditto, other	101,774	93,073
Commercial radio apparatus	461,569	256,217
Domestic radio apparatus	260,426	262,029
Telegraph, telephone and signalling apparatus	1,618,895	1,285,507
Radio loudspeakers	45,868	24,730
Sound reproducing apparatus, components and parts other than cinematograph apparatus	321,417	286,185
Other sound reproducing apparatus	84,370	71,715
Radio valves	214,011	162,330
Electric lighting carbons	23,021	7,536
Lamps not exceeding 24 V	33,468	32,097
Discharge lamps	26,525	31,292
Other lamps	73,104	107,743
Other lighting apparatus	352,381	470,354
Primary batteries	127,521	48,125
Parts other than carbons	25,846	16,277
Accumulators for motor vehicles	154,542	148,311
Ditto traction	12,760	24,223
Ditto radio	5,811	1,675
Other portable accumulators	132,327	86,521
All other accumulators	50,136	25,321
Parts and accessories	74,497	86,742
Cooking appliances	127,072	130,233
Heating appliances	49,064	52,947
Parts and accessories for cooking and heating appliances	46,762	46,238
Flat irons	51,102	45,091
Commercial electrical instruments	111,060	99,358
House service meters	131,332	116,398
Time recorders and time switches	28,633	4,405
Other electrical instruments	119,020	65,763
Electro-medical apparatus (not X-ray)	35,662	35,990
X-ray apparatus, tubes and parts	54,394	47,737
Permanent magnets	21,896	12,552
Insulating cloth and tape	80,677	84,404
Other insulating materials	87,523	96,456
Unclassified electrical goods and apparatus	446,851	396,474
TOTAL electrical goods and apparatus	7,388,434	6,917,491
Generators, up to 200 kW	502,505	992,459
Ditto, over 200 kW	350,957	156,532
Ditto, parts	218,615	108,615
Motors, railway and tramway	17,600	91,921
Ditto, other, not over ½ h.p.	69,351	93,093
Ditto, over ½ h.p. but under 1 h.p.	26,036	53,616
Ditto, from 1 h.p. to 250 h.p.	446,559	511,901
Ditto, over 250 h.p.	37,416	104,307
Ditto, parts	78,895	88,963
Converting machinery	17,833	9,934
Transformers, including coils	546,043	489,880
Rectifiers for power-house use	39,357	20,228
Motor starting and controlling gear	230,213	166,188
Switchgear and switchboards (not telegraph or telephone)	895,689	896,417
Other electrical machinery	25,975	22,561
TOTAL electrical machinery	3,503,053	3,806,615
Vacuum cleaners and parts	204,535	174,062
Other electrically operated portable appliances	102,504	136,080
Portable electric tools	81,022	53,285
GRAND TOTAL	11,279,548	11,087,533

£3,311,191 (£5,815,596) being second. New Zealand increased its demand from £1,981,758 to £2,538,938, and six other countries—Pakistan, the Irish Republic, Sweden, the Netherlands, Egypt and Argentina—all took over one million pounds' worth.

TABLE II—DISTRIBUTION OF ELECTRICAL GOODS AND APPARATUS

Destination	June, 1950	June, 1949
	£	£
Channel Islands	35,201	34,896
Malta and Gozo	9,915	8,557
Cyprus	13,218	5,744
British West Africa ...	126,726	114,034
Union of South Africa ...	718,761	1,567,908
Northern Rhodesia ...	42,941	19,387
Southern Rhodesia ...	95,118	127,079
British East Africa ...	183,360	104,921
Bahrein, Koweit, Qatar and Trucial Oman	23,186	49,417
India	605,063	993,292
Pakistan	199,713	34,432
Malaya	460,548	157,235
Ceylon	68,984	46,636
Hong Kong	94,427	173,197
Australia	1,150,453	681,998
New Zealand	519,094	387,932
Canada	124,685	103,289
British West Indies ...	87,094	127,817
Anglo-Egyptian Sudan ...	46,492	20,899
Other Commonwealth Countries	68,385	72,602
Irish Republic	239,921	167,729
Soviet Union	33,714	68,438
Finland	26,105	82,182
Sweden	266,120	140,171
Norway	166,051	102,161
Iceland	5,017	9,123
Denmark	88,249	86,124
Poland	24,138	38,334
Germany	22,925	8,842
Netherlands	183,617	176,705
Belgium	108,294	71,123
France	112,426	65,627
Switzerland	31,478	16,922
Portugal	62,890	29,960
Spain	60,318	19,320
Italy	41,425	118,203
Austria	20,364	11,317
Hungary	33,063	15,585
Czechoslovakia	20,386	9,114
Greece	59,651	44,351
Turkey	38,791	20,797
Indonesia*	21,083	40,881
Netherlands Antilles ...	2,921	8,726
Portuguese East Africa ...	10,170	7,817
Syria	10,131	13,025
Lebanon	20,109	9,179
Israel	37,741	19,067
Egypt	227,888	180,280
Arabia	7,543	1,248
Iraq	29,449	79,863
Iran	43,846	97,821
Burma	39,713	33,098
Thailand	23,372	18,535
China	171	1,711
United States of America...	35,856	9,488
Mexico	4,993	12,152
Colombia	3,538	5,488
Venezuela	92,568	62,094
Chile	28,476	2,508
Brazil	125,670	32,053
Uruguay	11,983	23,425
Argentine Republic ...	187,930	87,628
Other Foreign Countries ...	104,976	38,004
TOTAL	7,388,434	6,917,491

* Includes Netherlands New Guinea in 1949 and 1950.

During the half year there was an increased demand for telephone and telegraph wires of both submarine (from £369,227 to £458,280) and other types (from £3,524,074 to £4,303,055), but exports of other classifications of cables and wires fell from £9,267,195 to £6,607,804. Improved commercial radio equipment sales (£2,349,079 compared with £1,433,378) more than counterbalanced a decline from £1,736,534 to £1,214,090 in exports of domestic radio sets. The demand for telegraph and telephone equipment still provides one of the brightest features of the market, rising from £7,519,623 to £8,766,820, of which Australia took £2,831,464 worth. Shipments of lighting appliances fell from £3,497,262 to £2,598,923.

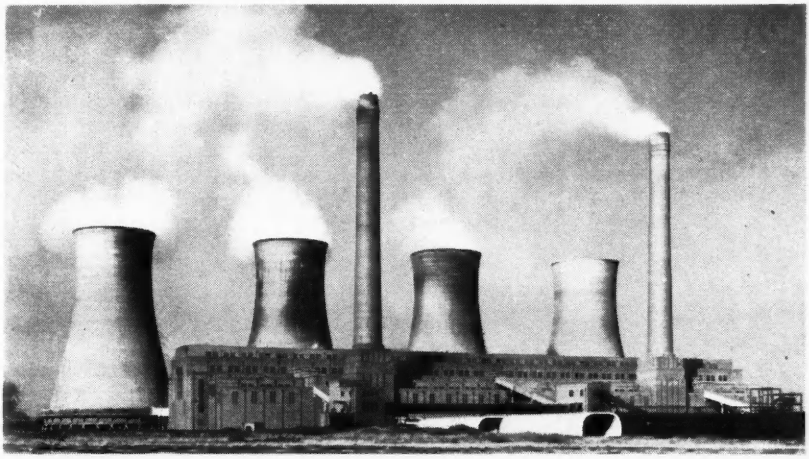
Exports in June amounted to £11,279,548, which was £250,524 more than in May and £192,015 more than in June last year. Actually the figures are even more satisfactory than they appear, since there were only twenty-five working days in June (Saturday, 24th June, was an extra holiday at the docks). Details of the individual classifications and also the destinations of the electrical goods and apparatus are given in our usual tables.

Welding Research

THE fifth annual general meeting of the British Welding Research Association was held at the Research Station, Abingdon, near Cambridge, on 13th July. Dr. J. H. Paterson, introducing the report, said that the Liaison Department had been reorganized and placed on a firm footing; the belief of the Council that it would usefully supplement the work of the Association by bringing the results of its work to bear directly on members' problems had been fully justified.

The Council was anxious to obtain the most modern types of testing plant vital to its work and recorded that a pulsating pressure testing plant for fatigue-testing pressure vessels had been installed, and a large tensile testing machine had been placed on order. These large and expensive equipments, however, demanded considerable laboratory space and the Council was therefore planning to build a fatigue-testing laboratory at Abingdon. This new laboratory would cost in the neighbourhood of £20,000, and an appeal for support would have to be made.

Dr. Paterson announced that Sir Stanley V. Goodall had consented to be vice-president of the Association, and he welcomed Sir Charles Lillicrap, the new chairman of the Council.



National Supply Survey

ELECTRICAL ASSESSMENT OF THE FOURTEEN AREAS

13 MIDLANDS AREA

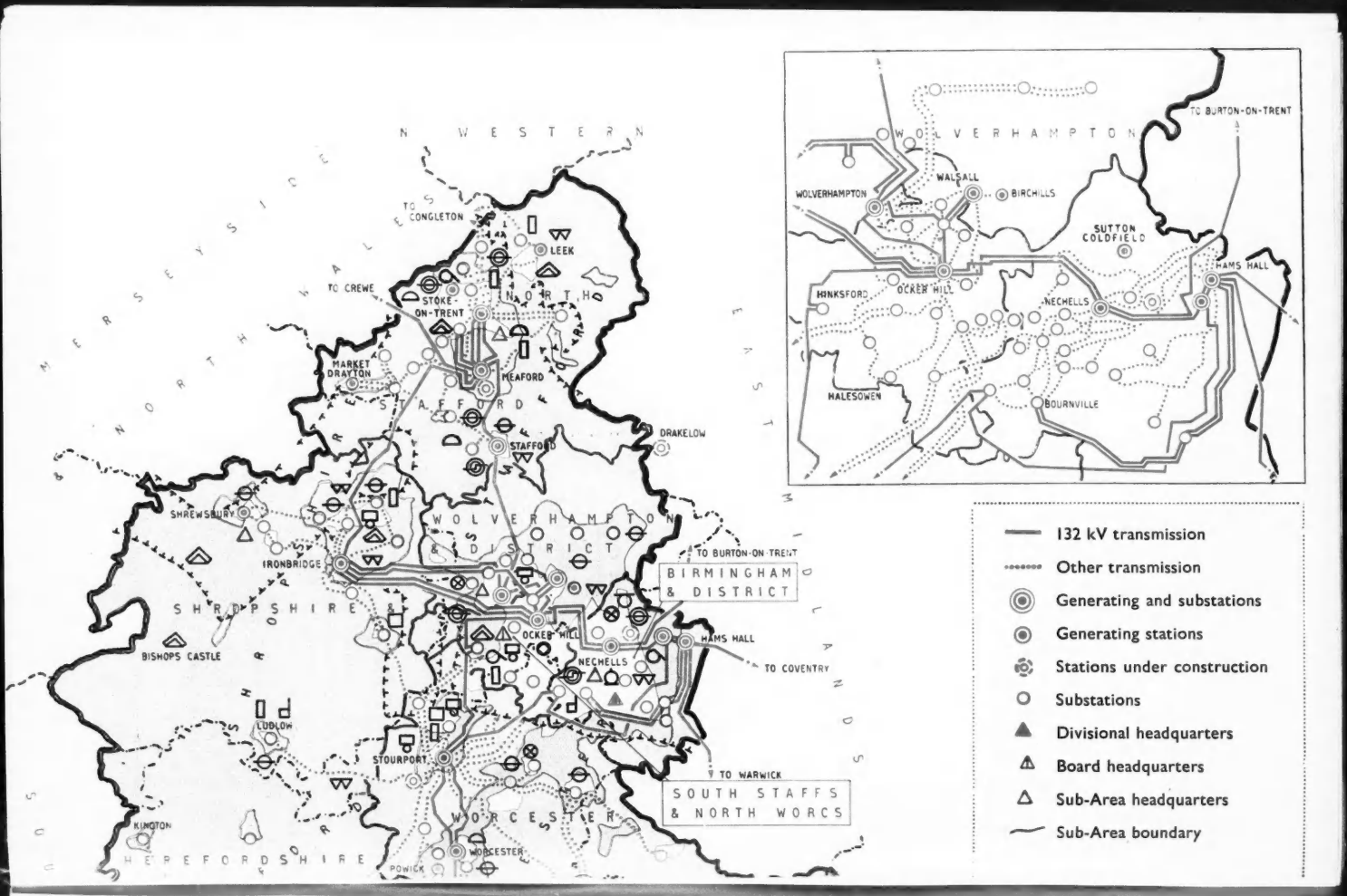
THE Midlands Area shares with the London Area the distinction of having no coast line. Its rich traditional background may be gauged roughly by the fact that this Area, together with the neighbouring East Midlands Area, forms the greater part of the territory which constituted the old Kingdom of Mercia. There are many striking contrasts in the Area, but perhaps the most outstanding one is that afforded by Birmingham, its largest city, with its great wealth of industry and commerce, and Shakespeare's Stratford-on-Avon.

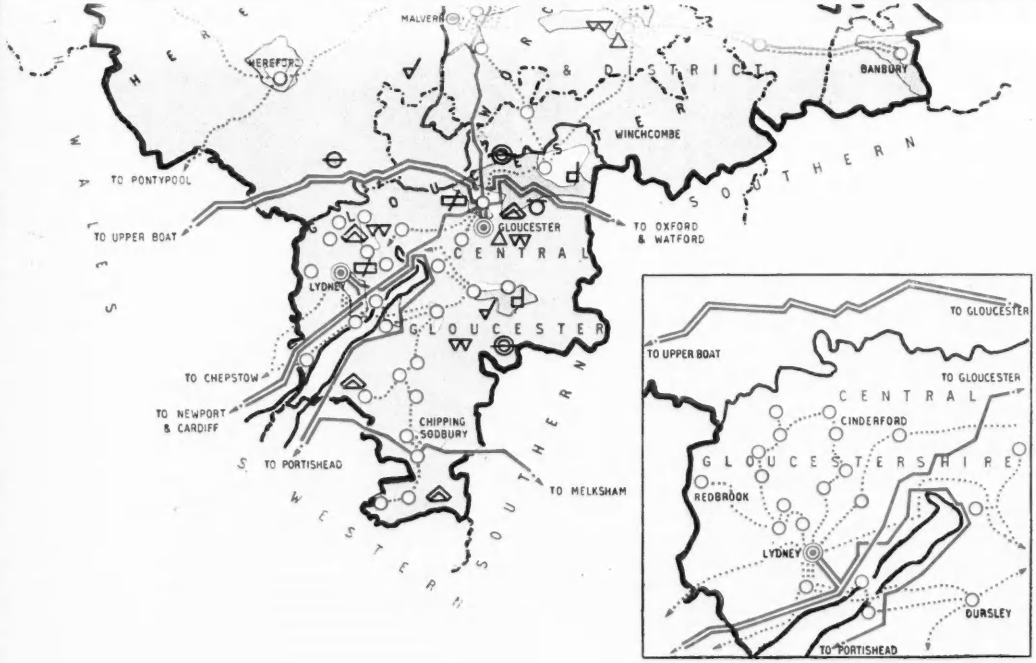
The Midlands Area shares part of its boundary with six neighbouring Areas: East Midlands from near Buxton in the north to near Banbury in the south, passing between Birmingham and Coventry; Southern to near Bath; South Western to near Chepstow; South Wales to near Kerry Hill, passing west of Ludlow Castle; Merseyside and North Wales to near Congleton; North Western to near Buxton. In the south are the Malverns.

Covering 5,074 square miles, the Area is the fourth largest one, and it includes Herefordshire, Worcestershire, and parts of the counties of Gloucester, Oxford, Salop, Stafford and Warwick. Among the Area's county towns are Worcester, Hereford and Gloucester, each with a fine cathedral, and the Rivers Severn and Wye add much beauty to the Area.

The following electricity undertakings were acquired by the Board: Birmingham Corporation, Cannock U.D.C., Cheltenham Corporation, Gloucester Cor-

With an effective capacity of about 300 MW, Hams Hall "B" is the largest generating station in the area


N W E S T E R N
TO CONGLETON
LEEK
TO CREWE
STOKE-ON-TRENT
N O R T H
MARKET DRAYTON
MEAFORD
S T A F F O R D
STAFFORD
DRAKELOW
SHREWSBURY
W O L V E R H A M P T O N
& D I S T R I C T
TO BURTON-ON-TRENT
IRONBRIDGE
BIRMINGHAM
& DISTRICT
S H R O P S H I R E
OCKER HILL
HAMS HALL
NECHELLS
TO COVENTRY
BISHOPS CASTLE
LUDLOW
STOURPORT
TO WARWICK
SOUTH STAFFS
& NORTH WORCS
W O R C E S T E R
KINGTON
H E R E F O R D S H I R E
WORCESTER
POWICK
TO BURTON-ON-TRENT
W O L V E R H A M P T O N
WOLVERHAMPTON
WALSALL
BIRCHILLS
SUTTON COLDFIELD
HAMS HALL
HINKSFORD
OCKER HILL
NECHELLS
HALESOWEN
BOURNVILLE
132 kV transmission
Other transmission
Generating and substations
Generating stations
Stations under construction
Substations
Divisional headquarters
Board headquarters
Sub-Area headquarters
Sub-Area boundary



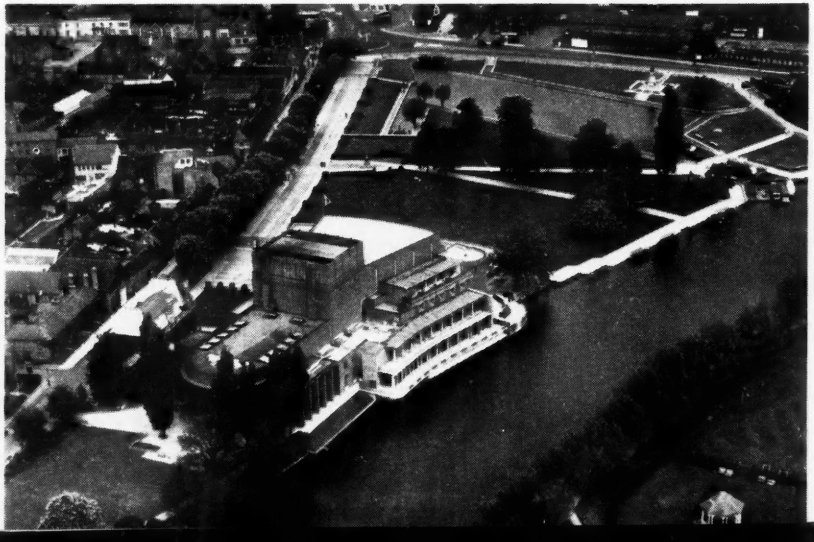
- County boundaries
- Heavy engineering
- Light engineering
- Aircraft production
- Steel works
- Clothing
- Light industry
- Chemicals
- Brickworks
- Quarries
- Carpets
- China clay
- Furniture
- Motor works
- Railway workshops
- Power station generating plant
- Rubber
- Agricultural implements
- Coal fields

The chosen characterizing background to this electrical assessment map of the Midlands Area, based on a map provided by the Midlands Electricity Board, is "load density." This, of course, adds considerably to the interest of the load analysis given in the text. Load density (kW per sq. mile) is indicated as follows: White, over 500; blue, 100-500; red, less than 100. Although the Castle Meads (Gloucester) and Lydney stations are within the Midlands Area, they are operated by the South Western and South Wales Divisions, respectively. The Drakelow station is to be built just outside the Area, but it will be operated by the Midlands Division. The above electrical assessment map was specially prepared by the *Electrical Review*.

poration, Leek U.D.C., Lichfield Corporation, Malvern U.D.C., Newcastle-under-Lyme Corporation, Stafford Corporation, Stoke-on-Trent Corporation, Stone U.D.C., Sutton Coldfield Corporation, Walsall Corporation, Walmley R.D.C., West Bromwich Corporation, Wolverhampton Corporation, Worcester Corporation, Chasetown and District Electricity Co., Market Drayton Electric Light & Power Co., Midland Electric Corporation for Power Distribution, Ltd., Shropshire, Worcestershire & Staffordshire Electric Power Co., Stroud Electric Supply Co., West Gloucestershire Power Co. (including Thornbury & District Electricity Co.), Trent Valley & High Peak Co., the West Midlands J.E.A., and the North West Midlands J.E.A.

There are service centres at Stoke-on-Trent, Leek, Newcastle-under-Lyme, Stone, Stafford, Market Drayton, Hanley, Longton, Burslem and Eccleshall in the North Staffordshire Sub-Area; Wolverhampton, Cannock, Rugeley, Lichfield, Chasetown, Walsall and Brownhills in

Probably the greatest contrast in the Area is afforded by the City of Birmingham (above) with its great industries and commerce, and Stratford-on-Avon (below) with its Shakespearean traditions



the Wolverhampton and District Sub-Area; Bearwood, Blackheath, Dudley, Halesowen, Netherton, Oldbury, Smethwick, Stourbridge, Wednesbury, West Bromwich, and Smethwick in the South Staffordshire and North Worcestershire Sub-Area; Birmingham (six), and Sutton Coldfield in the Birmingham and District Sub-Area; Gloucester, Cheltenham, Cinderford, Dursley, Lydney, Nailsworth, Painswick, Chipping Sodbury, Stroud, Thornbury, Walmley, Wotton-under-Edge and Dudbridge in the Central Gloucestershire Sub-Area; Evesham, Banbury, Chipping Camden, Hook Norton, Malvern, Stow-on-the-Wold, Stratford, Tewkesbury, Upton-on-Severn, Winchcombe, Worcester, Kidderminster, Bewdley, Bromsgrove, Droitwich, Hollywood, Martley, Redditch, Rubery and West Hagley in the Worcester and District Sub-Area; Shrewsbury, Bishops Castle, Bridgnorth, Church Stretton, Coalbrookdale, Knighton, Ludlow, Newport (Salop), Shifnal, Pontesbury, Wellington, Much Wenlock, Hereford, Bromyard, Ledbury, Leominster, Newent, Ross-on-Wye, Kington and Presteign in the Shropshire and Herefordshire Sub-Area. At Aston Field, Bromsgrove, there is also a service training centre to which we will refer later.

The following outline of the tariffs indicates the position which had arisen from the separate developments of the above former undertakings. There are 14 main groups of tariffs embraced by the four major load fields—domestic, commercial, industrial and agricultural (farms). In the domestic field we have the following groups: Separate flat or block rates for lighting, heating, cooking and water heating; all-in block-type tariffs with initial blocks based on rateable value and dimensions of premises; two-part or all-in tariffs with fixed charges based on rateable value, number of rooms and dimensions of premises; and flat rates for all purposes.

The commercial tariffs include several flat or block rates for lighting, heating and cooking, power and water heating; two-part tariffs with fixed charges based on installed lighting, installed load, rateable value, number of rooms, dimensions of premises; two-part tariffs with fixed charges based on kW and kVA metered demands; and block tariffs with initial blocks based on kW demand.

The three industrial groups of tariffs are separate flat or block rates based on consumption; block rates with initial blocks based on h.p. installed and kW demand, and two-part tariffs with fixed charges based on kW and kVA demands, installed wattages, and kW demand for lighting. The agricultural tariff groups are separate flat or block rates; block type tariffs and two-part tariffs with fixed charges based on rateable value, dimensions of premises, numbers of rooms, acreage and installed wattage.

Formerly the headquarters of the C.E.B.'s Central England Scheme the Midlands Division H.Q. still incorporates the Birmingham grid control centre ; (right) the Midlands Board H.Q. at Halesowen was formerly the headquarters of the Shropshire, Worcestershire & Staffordshire Electric Power Co.

Midlands Division Organization
Divisional Controller
Divisional Secretary (Liaison ; Joint Services Division/Area Board)
Divisional Accountant
Chief Generation Engineer (Operation)
Chief Generation Engineer (Construction)
System Operation Engineer
Transmission Engineer
Technical Engineer
Wayleaves, Estates and Establishments ; Contracts ; Coal and other Purchasing ; Welfare, Education and Training
Salaries and Wages ; Production Costs, Capital Expenditure
Generation Engineer (O) (Southern Group)
Generation Engineer (O) (Northern Group)
Generation Engineer (C) (Southern Group)
Generation Engineer (Northern Group)
Transmission Maintenance and Construction
Protective Gear, Communications, Metering and Technical Developments
Southern Group Generating Station Superintendents
Northern Group Generating Station Superintendents
Civil, Mechanical and Electrical Construction
System Control and Operation Statistics

In the foregoing we have attempted to define the Area with the emphasis on the electrical position immediately before vesting date, and this leads us to the major purpose of the article, namely, to assess the Area electrically. This is done very broadly by our special electrical assessment map. The Board and Division structures are shown in the accompanying organization trees. At the former headquarters of the Shropshire, Worcestershire and Staffordshire Electric Power Co., now the Midlands Electricity Board H.Q., Mucklow Hill, Halesowen, near Birmingham, Alderman W. S. Lewis, chairman, and Mr. D. H. Kendon, deputy chairman, lead the Board team, the other members of which are Mr. G. F. Peirson, chief engineer, Mr. H. J. Gibson, chief commercial officer, Mr. A. Stephens, secretary, and Mr. F. Nock, chief accountant.

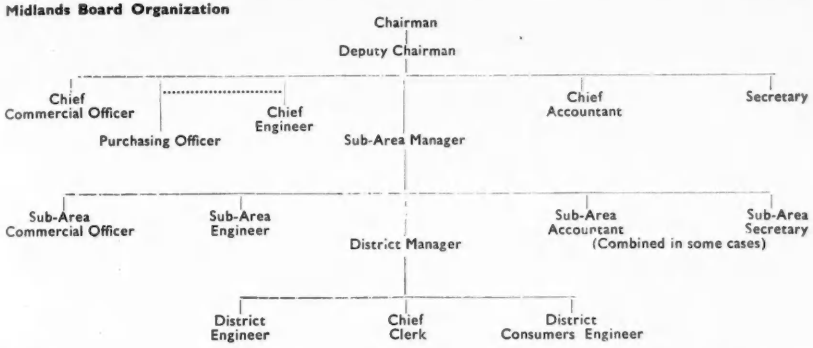
Similarly, British Electricity House, 55, Wake Green Road, Moseley, Birmingham, the former headquarters of the Midlands Area of the Central Electricity Board, and where the control centre for the Birmingham grid control area still is, is now the H.Q. of the Midlands Division of the British Electricity Authority. Mr. F. W. Lawton, divisional controller, leads the divisional team, the other members of which are Mr. S. W. Skelcher, chief generation engineer (operation), Mr. L. F. Jeffrey, chief generation engineer (construction), Mr. H. S. Davidson, divisional transmission engineer, Mr. J. D. Findlay, divisional system operation engineer, Mr. E. V. Hardaker, divisional technical engineer, Mr. H. N. Wilson, divisional secretary, and Mr. W. Roberts, divisional accountant.

For transmission maintenance purposes the Division is divided into four sections with headquarters in Birmingham, Stourport, Bushbury (near Wolverhampton) and Meaford. In Birmingham there is also the Transmission Department's main stores and workshops.

As a generation area the Midlands is the third largest, with an effective main generator output of 1,366.231 MW, and to convey the broadest possible picture of the generation position of the Area as a whole we publish on page 148 a schedule of stations at present operated by the Division.

The two largest stations, i.e., Hams

Midlands Board Organization



Hall "A" and "B," together have a capacity of nearly 40 per cent of the total for the Area. There are only four other stations with capacities over the 100 MW mark, and the total capacity of these six stations is 80 per cent of the whole. There are three stations with capacities under 1 MW, and their aggregate capacity

The Board Executive Team. Seated, left to right: Mr. D. H. Kendon and Alderman W. S. Lewis. Standing, left to right: Mr. G. F. Peirson, Mr. F. Nock, Mr. H. J. Gibson and Mr. A. Stephens

The Division Executive Team. Seated, left to right: Mr. W. Roberts, Mr. F. W. Skelcher, Mr. F. W. Lawton, Mr. L. F. Jeffrey and Mr. H. N. Wilson. Standing, left to right: Mr. E. V. Hardaker, Mr. H. S. Davidson, Mr. C. H. Petford and Mr. J. D. Findlay

is less than 0.1 per cent of the whole.

The Walsall station, which at the present time is in commission with 90 MW will have an ultimate capacity of 180 MW. Stourport "B" and Nechells "B" are still under construction. They will have an ultimate capacity of 120 and 210 MW, respectively. Two further stations are projected, namely, Meaford "B" and Drakelow, with capacities of 240 MW each.

During the year ended 31st March, 1949, 5,048.74 million kWh was generated by the Midlands Division, and 4,711.55 million kWh was sent out. The total kWh sent out by the Birmingham grid control area amounted to 7,501.97 million, while 285.09 million kWh were imported from other areas and 329.70 million kWh exported to other areas. The m.d. met in the Birmingham grid control area during this period (i.e. to 31st March, 1949), which occurred on 4th January, 1949, was 1,804 MW, and the average system frequency at that time was 48.7 c/s. There was no load shedding in operation at the time, apart from a reduction of 48 MW due to low frequency.

The Transmission Department is responsible for over 400 miles of 132 kV transmission lines and for twenty substations with a total capacity of over 1,750,000 kVA associated with the generating stations and supply points to the Midlands Electricity Board. Some of the principal substations with their main transformer capacities in kVA are:—Hams Hall "A" and "B" (390,000), Nechells (90,000), Ocker Hill (120,000), Walsall (150,000 when completed), Wolverhampton (90,000), Ironbridge (180,000), Stafford (45,000), Meaford (132,000), Bagnall Street (120,000 when completed), Stourport (120,000), and Worcester (45,000).

Following the foregoing statistics relating to overall loadings, etc., it is fitting before attempting to draw up a load analysis proper to pave the way by means of a locational analysis, and in this connection we draw attention particularly to the load density background of the electrical assessment map which should be read in conjunction with the following notes.

The percentages of urban and rural territories in the Area are 13 and 87, respectively. The corresponding population densities are urban 5,300 per square mile and rural 170 per square mile. The overall population density of the Area is 800 per square mile. The largest cities and towns are Birmingham, with a population of about a million, Stoke-on-Trent (about 300,000), Wolverhampton (about 180,000) and Walsall (about 150,000). The only other town which has an indication of a population density in the "dense urban" (over 25,000 per square mile) on the Ordnance Survey "Population Density" map is Gloucester. In each

GENERATING STATIONS OPERATED BY THE MIDLANDS DIVISION

Station	Previous Owners	Type (Steam and/or oil, etc.)	No. of shifts operated per day on normal winter basis	Total generators installed plant capacity—MW	Effective main generator output MW. s.o.
Hams Hall "B"	Birmingham Corporation	Steam	3	321	300.0
Hams Hall "A"	Birmingham Corporation	Steam	2	248.7	230.0
Ironbridge	West Midlands J.E.A.	Steam	3	200.0	190.0
Stourport-on-Severn ...	S.W. & S. Electric Power Co. ...	Steam	2	181.75	173.0
Nechells (Princes) "A" ...	Birmingham Corporation	Steam	2	117.75	93.0
Meaford	North West Midlands J.E.A.	Steam	3	120.0	112.0
Ocker Hill	West Midlands J.E.A.	Steam	3	84.5	69.0
Wolverhampton	West Midlands J.E.A.	Steam	2	30.0	28.0
Hylton Road...	Worcester Corporation	Steam	2	40.5	37.0
Stoke-on-Trent	North West Midlands J.E.A.	Steam	2	37.0	28.0
Birchills	West Midlands J.E.A.	Steam	2	17.5	16.0
Stafford	North West Midlands J.E.A.	Steam	2	3.0	3.0
Roushill	West Midlands J.E.A.	Oil	2	1.05	1.028
Sutton Coldfield	Boro. Council of Sutton Coldfield ...	Steam	2	1.0	0.993
Leek	Leek Urban District Council	Oil/Gas	2	0.7	0.684
Newcastle-under-Lyme ...	Newcastle-under-Lyme Corporation ...	Oil	2	0.45	0.44
Market Drayton	Market Drayton E.L. & P. Co. ...	Oil	2	0.088	0.086
Walsall	West Midland J.E.A.	Steam	2	90.0	84.0

Lichfield, with its beautiful cathedral, is one of the interesting cities in the Area and (below) Stoke-on-Trent, in the Potteries, is the second largest centre in the Area, and an example of the industrial side

Aerofilms photos

case these "highest range" indications are ringed in turn by those of urban (6,400 to 25,000) and suburban or industrialized rural (400 to 6,400). Cheltenham, the spa health resort in Gloucestershire, Hereford, Worcester, Stratford, Kidderminster, Bridgnorth, Shrewsbury, Wellington, Oakengates and Stafford all have "urban gradings."

Among the very many smaller towns and villages one may mention Boscobel (Shropshire) to where Charles II escaped after his defeat by Cromwell at Worcester; Much Wenlock (Shropshire), where one can see the ruins of St. Milburge Monastery, and which is near the world's first iron bridge from which the village and hence the power station took their names: Tewkesbury (Mrs. Craik's "John Halifax, Gentleman"); Broadway, Worcestershire, with its famous Tudor house the Lygon Arms; Chipping Campden, Gloucestershire, where many admire the Market Hall; and Tenbury, Worcestershire, where stands St. Michael's College, famous in the world of music.

Of value in such an assessment and locational analysis are the industrial locations. Perhaps one should refer first to the notably heavy industry of the Black Country, west of Birmingham, which seems to have as its hub Dudley, the birthplace of Newcomen's beam engine. Bilston, Willenhall, Wednesfield, Wednesbury, Darlaston, Sedgeley, Tipton, West Bromwich, Blackheath, Brierley Hill, Oldbury, Smethwick, Stourbridge and Halesowen all have a similar story to tell—steel rolling, tubes and heavy sections, stampings, constructional engineering, foundries, machine tools, chain making, and numerous associated industries. And the light alloys industries are now creeping in too. Next we must refer to the remarkable mixture of heavy and light industry at Birmingham which seems to range from the smelting, casting and rolling of both ferrous and non-ferrous metals on the one hand, to the production of pen nibs, buttons and toys on the other hand. But in this range one may mention, in particular, the manufacture of cycles, guns and ammunition and heavy electrical generating plant.

Then there is the Midlands Coalfield which extends beyond Shrewsbury in the west, over the eastern boundary of the Area, to beyond Stoke-on-Trent in the north and to a little south of Birmingham. It is not comparable in output with some of the coalfields we have spoken of in other areas, but there are two important clusters of pits, one in the Stoke-on-Trent district and one in the Cannock district. The larger group is that at Stoke in which there are about a dozen of the larger official grading of mines, i.e., over one thousand men employed. In addition, in North Staffordshire there is, of course, the great pottery area of the "Five Towns" with associated tile making, brick works and engineering, important heavy electrical generating plant production at Stafford, and textile industries at Leek. Kidderminster is famous for its carpets and Redditch for its springs, needles and fishing tackle.

In Shropshire we may think of beet sugar manufacture, flour mills, fruit can-

Fort Dunlop, claimed to be the largest rubber factory in the Commonwealth, is the Board's biggest consumer

The Vale of Evesham, with its cider apple orchards, is a renowned beauty spot in the Midlands Area *Aerofilms photo*

ning, furniture making, tyre making and the B.B.C. transmitting station at Ludlow, in addition to a good range of light and medium engineering. The Wolverhampton and Walsall district is concerned largely with motor vehicles, rubber production, artificial silk, leather tanning, foundries and general engineering. And there is now the television station at Sutton Coldfield. In and around Worcester there are more potteries and textile factories, while nearer Evesham are canning factories and at Banbury the great wartime development of aluminium production. In central Gloucester there is a good deal of food production, plywood manufacture, quarrying, clothes making, textile work, furniture making, aircraft production, cider brewing and light engineering.

The numerous small industrial centres set in very extensive agricultural country are an important feature. This statement is strongly supported by a glance at the Ordnance Survey "Types of Farming" map which shows a large area of predominantly dairying land in the extreme north; another large area of mixed farming with substantial dairying north-west and south-west of Birmingham; mixed dairying around Shrewsbury and again in a strip along the Severn up to Evesham, where there is considerable market gardening and, of course, the cider apples in the Wye Valley; and in the extreme south and west there is mixed farming.

Details of a few of the largest of the Midlands Electricity Board's consumers will add interest to the locational industrial survey which we have just attempted. The Northern Aluminium Co., Ltd., Banbury, which has a factory area of about 12 acres, a personnel of some 2,800 and produces primarily "Noral" light alloy sheets and extruded sections, has a m.d. of 7,000 kVA and an annual consumption of 38.7 million kWh. Fort Dunlop, the factory at Birmingham of the Dunlop Rubber Co., Ltd., is claimed to be the largest rubber factory in the Commonwealth. It employs nearly 10,000 people, who are dispersed with the factory buildings over a vast site of 260 acres. The major product of the factory is tyres. The annual consumption is about 81 million kWh and the m.d. is about 20,000 kVA.

The Austin Motor Company's factory at Birmingham has its own generating plant which, in conjunction with the supply of process steam, yields 15 million kWh per year with a m.d. of about 3,500 kW. This supply, however, is supplemented by one from the public mains from which are taken about 35 million kWh per year with a m.d. of about 11,000 kW. The Goodyear Tyre and Rubber Co., Ltd., has a factory at Wolverhampton which takes from the public supply

about 37 million kWh per year with a m.d. of about 6,800 kVA for the production of tyres, conveyor belting, etc.

The following locational analysis table in Sub-Area form will serve well to complete the foregoing locational story:—

LOCATIONAL ANALYSIS TABLE

Area	Area in sq. miles	Population	Consumers Connected at 31st March, 1949
North Staffs Sub-Area	711	549,000	126,749
Wolverhampton Sub-Area ...	323	456,000	118,820
South Staffs and North Worcs Sub-Area ...	129	694,000	158,634
Birmingham and District Sub-Area	214	1,242,000	342,043
Central Gloucestershire Sub-Area	638	347,000	74,690
Shropshire and Herefordshire Sub-Area ...	1,924	331,000	62,534
Worcester and District Sub-Area	1,135	434,000	96,983
Bulk Supplies			3
Midlands Area ...	5,074	4,053,000	980,456

As the next step in the load analysis we present a consumers' analysis table in load classification form:—

CONSUMERS' ANALYSIS TABLE

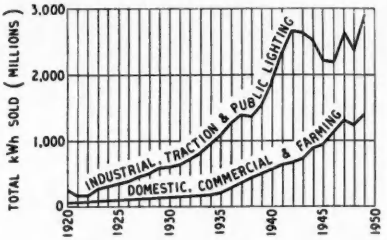
Loads	Number of Consumers at 1st April, 1948	Connected since	Total at 31st March, 1949
Industrial ...	21,018	762	21,780
Traction ...	4	—	4
Farms ...	7,878	1,185	9,063
Domestic and business ...	908,638	40,776	949,414
Public lighting ...	180	12	192
Bulk supplies	3	—	3
Totals ...	937,721	42,735	980,456

It is logical now to attempt a load analysis table, with a consumption basis.

LOAD ANALYSIS TABLE

Loads	Million kWh sold 1948/49
Industrial	2,460.0
Traction	55.9
Farms	9.8
Domestic and commercial ...	1,516.7
Public lighting (all types) ...	16.3
Bulk supplies to other Area Boards	16.9
Total	4,075.6*

*Associated with this consumption is the m.d. of 1,125,506 kW.



This load development over 30 years will prove of interest in conjunction with the analysis

We think the above load development chart over the past 30 years will prove to be of considerable interest in conjunction with the above analysis, but we once again refer especially to the load density background of our electrical assessment map.

The Midlands Board is carrying out a vigorous policy of development throughout the whole of the Area, and the resources of all the former undertakings have been co-ordinated, so that full advantage can be taken of them to speed up development, particularly in the rural areas. The change-over from d.c. to a.c. supplies will proceed as rapidly as material, labour and economic circumstances allow, but first consideration is being given to connecting new consumers and dealing with the war-retarded development. Service to consumers is regarded as of the greatest importance, and the Board sells to consumers all types of electrical appliances, including radio and television, on cash or credit sales terms. A service training centre has been established at Aston Field, Bromsgrove, for the purpose of keeping the staff, especially those in contact with the consumers, up to date with information on the Board's organization and policy and on the latest developments in appliances, etc. These notes on the Board's activities are to some extent an indication of the future load developments, but in particular increased load may be expected in the following industries: pottery, automobile, iron and steel, coal, light and heavy engineering, and rubber.

We are indebted to Alderman Lewis and Mr. Lawton and to their principal officers, for the co-operation which has made it possible to produce this contribution to our National Supply Survey.

Commerce and Industry

Third British Electrical Power Convention
Canadian Television Contract

WE have already announced that next year's British Electrical Power Convention is to be held at Brighton under the presidency of Sir Henry Self, deputy chairman (administration) of the British Electricity Authority. We are now informed that it will take place during the week commencing 18th June.

Cable-Making Occupation Schedules

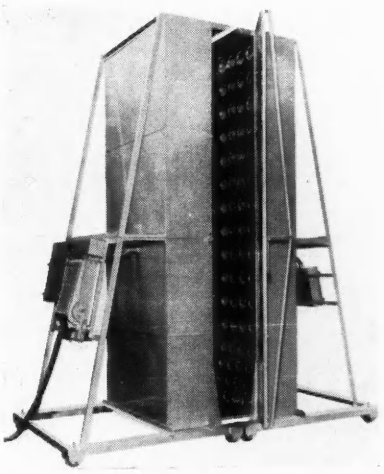
The schedules of classifications of occupations in the manufacture of covered conductors applicable to male and to female workers recommended by the appropriate Standing Joint Committee have been adopted by the Joint Industrial Council for the Electrical Cable-Making Industry, and any changes in rates of wages consequent upon their adoption will come into effect on the third pay day in July in respect of the period for which payment is made on that day.

Industrial Capacitors

B.S.1650 Part I deals with industrial capacitors for connection to power frequency systems and covers all impregnated paper dielectric fixed capacitors normally rated in kVAr. It also covers continuously rated capacitors for power factor correction, and supersedes B.S.1082 (fixed capacitors) in so far as it relates to industrial capacitors for power systems. Copies are available from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 2s 6d, post free.

Infra-red Equipment for Finland

For the rapid stoving of paint on conduit tubing infra-red lamp equipment has recently been exported to Finland by the General Electric Co., Ltd., for installation in the premises of Finska Kabelfabriken A.B. This plant has been designed to fit into a continuous production line in which the tubes are carried on a conveyor through the complete finishing process which includes automatic dipping, draining, flash-off, stoving and forced cooling. It comprises two opposing sections each 4ft wide and containing a total of 256 "Osram" infra-red reflector lamps. These are mounted in aluminium alloy secondary reflectors to prevent loss of heat by stray radiation and to avoid the cooling effect of draughts. A gap between the top reflectors allows the work, which is suspended from the overhead conveyor, to be carried into the plant, and doors with inner reflecting surfaces are provided on each side so that the plant may also be used for batch production.



Infra-red stoving equipment as recently exported to Finland by the G.E.C.

The stoving time is 3 to 3½ min for tubes of ¾in to 2in outside diameter and up to 10ft in length. The tubes can be passed through the plant in two or three parallel staggered rows, and outputs of up to 900 lengths per hour can readily be obtained. The total electrical loading is 64 kW, and is drawn from a three-phase supply.

Flameproof Apparatus

It is announced that the Ministry of Fuel and Power's quarterly lists of certified flameproof electrical apparatus is to be extended to include information concerning all types of apparatus approved or certified during

each quarter. In addition to the list of flameproof electrical apparatus certified between January and March, 1950, the next publication will contain information on all apparatus approved or certified since 31st October, 1948. Apparatus approved up to that time was included in the 1948 edition of "Regulations and Orders Relating to Safety and Health." The new lists are available from the Librarian, Ministry of Fuel and Power, 7, Millbank, London, S.W.1, price 1s, including postage.

Zinc Premiums

The Ministry of Supply announces that as from 18th July the premiums for refined and electrolytic zinc and zinc of not less than 99.99 per cent purity are increased as follows: Refined and electrolytic zinc, £4 10s (old premium 15s); not less than 99.99 per cent purity, £10 10s (old premium £2 5s). The price of G.O.B., Prime Western and debased is unchanged.

The prices of zinc metal sold by the Ministry per long ton delivered buyer's premises are, therefore: G.O.B., Prime Western and debased, £127 10s; refined and electrolytic, £132; not less than 99.99 per cent purity, £138.

Next Year's B.I.F.

The British Industries Fair will be held next year from 30th April to 11th May, at Castle Bromwich, Birmingham, and Earls Court and Olympia, London.

Television Equipment for Canada

A second large dollar order for television equipment, placed by the Canadian Broadcasting Corporation with Marconi's Wireless Telegraph Co., Ltd., means that Britain is to supply the entire studio and outside broadcasting television equipment to start a Canadian television service. A few weeks ago an order to equip two studios in Toronto and two in Montreal was placed with the Marconi Co., which is now to supply, under the new contract, two specially designed television outside broadcasting vehicles. These vehicles will be complete television stations on wheels and will cost over $180,000. Each vehicle is to be a three-camera station, using Marconi Mark II cameras, and will be fitted with full video, audio and radio link equipment. Behind the driver's seat, on the right-hand side, will be special stowage for the three Marconi cameras, power distribution unit and battery charger, and power regulator unit. On the left-hand side will be a built-in ladder to the roof (where the radio link is erected), a workbench, a heater-cooler plant, pulse former and shaper units, power and communication units. In the rear half of the vehicles there will be three camera control monitors, audio and vision mixer control units forming a complete control console. Above this console will be a link control unit and a monitor receiver. Below the console a row of cable drums carrying all the cables needed for three-camera operation will be fitted.

Italian Electrical Exhibition

The Italian First International Exhibition of Electrical Appliances will be held, under the authorization of the Ministry of Industry and Commerce, in the building and grounds of the Bologna University from 16th September to 1st October next, during the celebration of the first centenary of the birth of Augusto Righi, the Bolognese scientist. One international and eight national congresses are to be held in connection with the celebrations.

The closing date for applications for space is 31st August. Inquiries and applications should be addressed to Mostra Internazionale di Applicazioni della Elettricita, Via Farina 6, Bologna. Any communication about this notice should be sent to the Board of Trade, Exhibitions and Fairs Division, Lacon House, Theobalds Road, London, W.C.1 (telephone; Chancery 4411, Ext. 417).

Heating in the "New Australia"

"Thermovent" and "Thermotube" heaters manufactured by E. K. Cole, Ltd., are installed throughout the *New Australia*, 360 heaters providing the full heating requirements in all the public rooms except the dining saloons, where "Thermovents" cater for the basic structural heat losses only, the losses due to air changes being taken care of by a "Crittall Marine" tempered air plenum system. The total loading of the heating equipment installed is of the order of 530 kW, and this provides a temperature rise of 37 deg F with a final temperature of 67 deg F.

Fatal Shock from Heating Tube

At Daventry last week a coroner's jury returned a verdict of "Death from heart failure following an electric shock accidentally sustained," in an inquest on P. S. J. Smith, Drayton, an employee of the Westbourne Engineering Co., Daventry. Evidence given by Mr. S. J. Emerson, H.M. Inspector of Factories, showed that Smith was operating a grinding machine at the time of his death, but an examination of the electrical equipment of the machine proved it to be in good order.

By the machine was a metal chair which had come into contact with the lower of a pair of tubular heaters mounted on the

wall. It was found that the metalwork of this tube was not earthed and that it had an internal fault which caused the tube to be charged with 250 V. The control switch was in the "on" position. Apparently Smith came into contact with the leg of the chair and, having his hand on the earthed machine, received the full current from the defective tube through his body. Mr. Emerson said the tube was very shoddy and there were "hundreds of them on the market."

An electrician employed at the works said that he heard Smith cry "Electric shock. Switch off." He immediately cut off the power from the machine and then pulled the main switch. He dragged Smith clear of the machine and, with two other men, started artificial respiration, but when a doctor arrived he said that Smith was dead.

Taunton Industries Fair

An example of the practical collaboration with the contracting industry which the South Western Electricity Board is seeking to develop in its Area is provided by the joint exhibit at the Taunton Industries Fair, to be held on 5th-12th August. This exhibit is being prepared by the Taunton Electrical Development Group, which is composed of members of the Board's local staff and local contractors. A number of similar bodies have been set up in the south-west following a meeting at Bristol in November last between senior officers of the Board and E.C.A. representatives, when agreement was reached on a policy of mutual support in local affairs.

Cables for Yugoslavia

A total of sixty-three miles of ship-wiring cables, valued at over £30,000, recently left the Derby works of Crompton Parkinson, Ltd., for Yugoslavia. The cables are to be used for a coastal shipping construction programme. To enable the consignment to pass through the limited handling facilities which exist in one part of its journey the weight of each drum had to be kept down to a maximum of one ton. This meant that the cables had to be shipped on no fewer than 337 drums. The cables, of different sizes up to 0·5 sq in, are of standard design. The accompanying picture shows part of the consignment loaded on lorries at Derby works.

Consignment of Crompton Parkinson ship-wiring cable ready for despatch to Yugoslavia

Engineering Wages Claim

Following upon the vote of the workers in the engineering industry in favour of arbitration, rather than a strike, the Confederation of Shipbuilding and Engineering Unions has asked the Minister of Labour to take "appropriate action." Mr. Isaacs has accordingly asked representatives of the Confederation and of the Engineering and Allied Employers' National Federation to meet officers of the Ministry of Labour today (Friday).

Scottish Electricians' Wages

As from the beginning of the first full pay period following 3rd July the wages of journeymen electricians employed in the electrical contracting industry in Scotland have been increased to 3s an hour. This follows an award of 1½d per hour made by the National Arbitration Tribunal. The wages of apprentices have been increased proportionately.

Trolley-Buses for Ipswich and Nottingham

Ipswich has recently put into service the first of twelve new four-wheeled trolley-buses. These are fitted with "Metrovick" electrical equipment on Sunbeam chassis. Electricity for lighting is supplied by a motor-generator set and an MV 209 traction motor is employed. These vehicles are replacing older ones now being withdrawn from service.

The first of forty-five new "Metrovick" six-wheeled trolley-buses has just been delivered to Nottingham. These vehicles are

equipped with battery manœuvring, and air inlet filters are fitted on the main traction motors and overhung generators. Provision is made for the fitting of automatic acceleration equipment. The chassis is by B.U.T. and an MV210 motor is employed with contra-field rheostatic braking.

Indian Engineering Exhibition

It is reported by *Indian Trade and Industry* that over forty countries have been invited to participate in an Indian International Engineering Industry Exhibition to be held in New Delhi in January next.

Annual Holidays

The works of Tungstalite, Ltd., will be closed for the summer holidays from 29th July to 14th August. The offices and lamp warehouse will be closed from 5th to 14th August.

The works and offices of the Arora Company will be closed from Friday evening, 4th August, to Monday, 14th August. A skeleton staff will deal with urgent inquiries.

The works and offices of William McGeoch & Co., Ltd., Birmingham, will be closed from 28th July until 9th August. A skeleton staff will deal with urgent matters.

Interference Suppressor Plugs

J. H. Tucker & Co., Ltd., point out that the B.S. Specifications to which their new interference suppressor plugs conform are Nos. 546 and 613—not 564 and 613 as stated in our last issue.

Motors for Canada

Small Electric Motors, Ltd., have been advised by the Canadian Standards Association that their complete range of motors has been approved.

Educational

The prospectus of day and evening classes at the Sir John Cass College, Jewry Street, Aldgate, London, E.C.3, for the 1950-51 session is now available and it can be obtained on application to the Principal.

Catalogues and Lists

Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, Watford By-Pass, Watford, Herts.—Technical folder on electric toolroom tempering furnaces.

Cantie Switches, Ltd., Port Causeway, New Ferry, Birkenhead, Cheshire.—Revised price list of heavy-duty switchgear announcing appreciable reductions.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced leaflet describing a soil sterilizer with plate-type resistance heaters.

Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—Technical brochure (No. E.B.430) containing general notes on the design, performance and available features of telephone type relays.

Pressed Steel Co., Ltd., Refrigeration Division, Cowley, Oxford.—Illustrated brochure on "Prestcold" refrigeration equipment for the fish trade.

G.W.B. Electric Furnaces, Ltd., Dibdale Works, Dudley, Worcs.—Technical folder on "Autolec" electrode hot-water boilers.

Trade Announcements

Mr. S. Braithwaite, 66, Greenfields Avenue, Appleton, Ches, has been appointed representative of **Ekco-Ensign Electric, Ltd.,** covering South-Western Lancashire. He will be based at the company's northern office, Kent Street Works, Preston, Lancs.

The Tuscan Engineering Co., Ltd., has opened a sales office at 447, Grand Buildings, Trafalgar Square, London, W.C.2 (telephone: Whitehall 4038-9). Inquiries and orders for stock motors, for any other standard machines and for service and repairs should be sent to 100, Lough Road, Holloway Road, London, N.7.

The address of Mr. J. H. Grierson, northern representative for the **Power Centre Co., Ltd.,** is now 68a, Allerton Road, Mossley Hill, Liverpool, 18. (Telephone: Sefton Park 4826).

William McGeoch & Co., Ltd., have opened an office at Bath for the South Western area. The address is c/o Western Industrial Agencies (Bath), Ltd., 11, Railway Street, Bath (telephone Bath 60416).

W. A. Sparrow & Co., Ltd., have removed to 4-7, Chiswell Street, London, E.C.1.

INFORMATION DEPARTMENT

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Cricklite" fittings.
"Simstar" reflectors.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

World Power Conference—III

Hydro-Electric Power

THERE are three general divisions into which the papers dealing with hydro-electric power naturally fall. The information about power resources and location of plant has come from Great Britain, Canada, United States, Sweden, Italy, Austria and India, with a thoughtful contribution of a statistical nature by Dr. Harnecker, of Chile.

The British paper is of special interest, for though this country's own water power resources are limited by geographical features, its contribution to the development of hydro-electric plant has been of first importance. The chief item for discussion is the considerable potential water-power in the Highlands of Scotland, estimated to be $6{,}300 \times 10^6$ kWh.

It is rather surprising that no Swiss paper appears in this section; but Sweden gives a notable review of progress in this field during the last few years. The most important technical advances have been made in connection with the location of stations in solid rock, forming in effect underground power plants; the improved technique of rock-fill dam construction; and the development of better cross-sections for buttress dams, in which a certain amount of reinforcement steel is introduced with consummate skill to enable a slight tensile stress in the upstream part to be taken successfully at a change of surface contour.

The papers from the United States (one) and Canada (two) give a general idea of the spectacular rise in the use of hydro-electric power. In the U.S.A., the total installed generating plant had grown to 16.6×10^6 kW by 1949, which represented nearly one-sixth of the total capacity of all prime movers in that country. Of plants exceeding 100,000 kW, no fewer than fifty-six are either in operation or in course of building. In Canada, the concurrent development is also most striking; the figures, given in horsepower, for the production of energy have risen from 4.2×10^6 in 1934 to 10.9×10^6 in 1949.

Technical advances cover nearly every aspect: earth dams are being used increasingly; it is becoming more usual to fix transformers and associated switchgear out in the open air; increasing use is being made of river flow data; and higher heads are being used for both Kaplan and Francis turbines; 100ft for the former and 925ft for the latter are mentioned.

With the increasing amount of interconnection between power systems, of which W. Russell Way (Canada) writes

Steam Generation Session: Messrs. A. M. Jacobs, South Africa, vice-chairman; C. K. F. Hague; A. Howell, reporter; and C. H. G ray, secretary of the World Power Conference

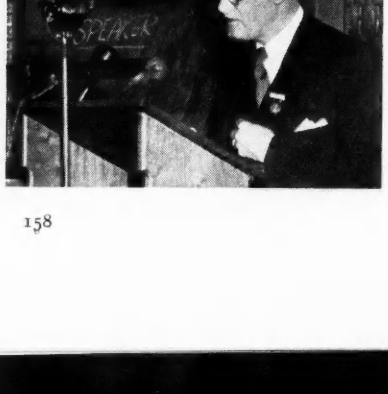
a most valuable and informative review, units are tending to become larger. At the same time the steadily mounting costs of materials and man-power are also having their effect on design.

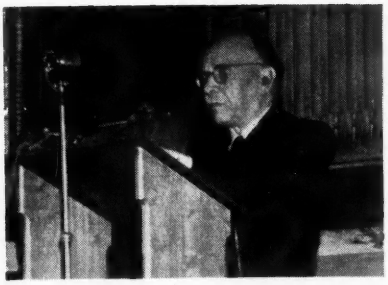
The Italian contributions deal largely with problems connected with storage reservoirs; the vital importance of hydro-electric power to the future of that country emerges more clearly than ever. The Alpine sources are far more important than those of the Apennines, amounting to 92 per cent of the total hydro-electric energy in Italy. Ucelli, in another section, mentions some notable pumps absorbing 61,000 and 40,000 h.p. respectively, delivering water against heads of 940 and 1,960ft.

France and the United States provide the contributions to the design of hydro-electric stations of the widest interest and application. The French approach is original, stimulating and controversial; the American is much more factual.

The French view, expressed by Rousselier, is that the size of units has now reached an economic maximum. What governs these considerations? Geologically, the local formations limit the tunnel size; the greatest practicable thickness of tunnel linings is another factor; the greatest diameter which can be used safely with banded pipe lines is yet another influence; the greatest permissible stresses in concrete have their effect on dams. In the plant itself cavitation and peripheral stresses impose limits and the loading gauge of railways, or other transport restrictions, may have a decisive effect. Production costs appear not to obey a straight-line law, but to approach more and more nearly to a

Mr. A. Howell summarizing eleven papers which dealt with steam generation





Mr. F. Munzinger, Germany, speaking in the course of the discussion on steam plant

limiting figure. On the whole, he feels that "technical limits are in advance of economic limits" and suggests that for a fair time ahead there may not be any startling departures from the present range of sizes of generating plants.

Some world records are mentioned in the American paper. The Nantahala turbine, with a maximum (net) head of 1,000ft, is believed to be the highest-powered high-head reaction turbine in the world. The output is 60,000 h.p. Enormous Francis and movable-blade turbines have been built: at Grand Coulee there are 150,000 h.p. Francis turbines working at 330ft head; at McNary Dam the adjustable-blade turbines have an output of 111,300 h.p., working under 80ft head.

An interesting section deals with constructional advances. Welded construction—without annealing—is in increasing favour for spiral casings, guide vanes, etc.; stainless steel is being employed more and more in an effort to reduce the effects of corrosion and cavitation, the steel being deposited either as an overlay or by pre-welding deposition. Bearings have received much attention; "closed-circuit" oil-circulating types are in use, while large new varieties of Kingsbury or spring thrust bearings are appearing. Fabricated construction is also being applied to generators.

Norway has given to the world her unique range of experience in the construction and running of power stations built into rock. The author, Heggstad, points out that the first underground power station in Norway was completed in 1921 and has since been working without any service troubles. The pre-

requisite is a sound rock formation, which can only be ascertained beforehand by careful geological methods. Tunnels may be lined or unlined for the pressure conduits; in certain cases accessible pipe lines may be used. The pressure-testing of shafts and tunnels has become a special part of the constructional technique. Condensation, ventilation and falls of rock problems have been very largely overcome. An interesting section of the paper deals with means for making the staff accommodation attractive and free from vibration.

There is a renewed interest in pumped storage plant, which is mentioned in one of the American papers, to enable peak demands to be met. It is intended to include such a plant in the future development of Niagara. It has been shown, in recent tests with models, that an efficiency of 88 per cent can be obtained at a given speed with a pump-turbine reversible unit running in either direction.

Of a group of seven papers on diverse aspects of the design only three deal with the plant generally; the others, which are none the less valuable, are extremely specialized. They are concerned with (1) the replacement of acceptance tests on scale models; (2) the theoretical design of Kaplan turbine blading; (3) the provision of a stone and gravel separator for a water-power conduit; and (4) progress in the design of chamber surge tanks.

The other three papers contain most useful information on the spheres of usefulness of impulse, reaction and movable-blade ("feathering-propeller") turbines; it is suggested that 1,640ft is about the upper limit for the reaction type, which has the accompanying advantage of an alternator which can run at a higher speed and have a higher capacity, thus keeping down the capital cost.

Fine clearances are a most important feature and the need to keep them always within their proper limits is stressed in a paper by Fismen (Norway). The variation of cavitation effects with running speed is also brought out and suggestions for the optimum speed and setting, in the light of probable cavitation effects, are made.

High-head reaction turbines are not regarded as suitable for low-load running. If the load is less than 0.4 of full load, with turbines working under 820ft head or more, the efficiency falls to an undesirably low figure; but above the 0.4 ratio, it is over 90 per cent through practically all the rest of the range of load.

The Italian contribution by Ucelli also discusses the different spheres of action for Kaplan, impulse and reaction turbines. He then goes on to the desirability of an international agreement under which the requirements of specifications would be standardized, especially with regard for guaranteed performance and acceptance tests. The advantages of uniformity in the various mathematical symbols used in hydro-electric work, and in the terminology used, are emphasized. This implies some measure of unanimity between makers and users of plant, but should not be impossible of achievement, bearing in mind what the International Electrotechnical Commission has already done.

The relentless move towards larger generating sets—both in output and in physical measurement — makes one wonder when some technical or economic limit will begin to operate. As items increase in size, so does the specialized

Gas-turbine Session: Messrs. V. Zepić, Yugoslavia, vice-chairman; R. J. Welsh and Dr. H. Roxbee-Cox, reporter

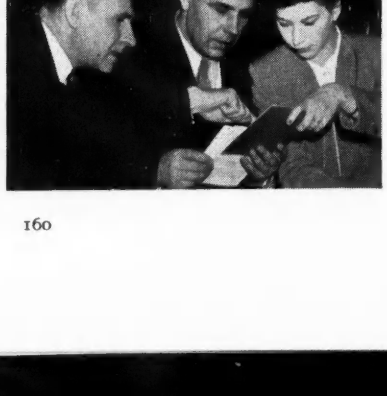
machinery needed for their manufacture, while the degree to which such machinery will be used tends rather to decrease. There is no evident limit yet in the meeting of purely technical demands, but, as already mentioned, transport of component parts is already becoming a formidable problem and the time and cost of manufacturing them may well begin to introduce economic limitations.

Works Visits

On 16th July, a number of overseas delegates to the fourth World Power Conference arrived in Rugby where they stayed at the Grand Hotel. After tea, a party proceeded by coach to Coton House, the B.T.H. Apprentice Hostel. The next day was devoted to a tour of the Rugby works. After being welcomed by Mr. K. R. Hopkirk, director and chief mechanical engineer, the visitors toured the research laboratory, heavy electrical plant, turbine gear, fabrication, and "Mazda" lamp factories. In the evening the visitors were entertained to dinner at the Grand Hotel. The chairman was Mr. E. V. Small, managing director, B.T.H. Export Co.

Fifteen of the Conference delegates visited two of the English Electric Co.'s factories during a tour of British industries. On 18th July they were welcomed at the company's Rugby works by Mr. E. M. Price, the manager, and by other officials, and in the evening they were entertained to dinner at Eaton Lodge Country Club, near Rugeley. Among officials of the company present were Mr. J. T. Moore, chief engineer, and Mr. R. J. Sanders, assistant commercial manager. On the following day the delegates paid a visit to the Stafford works of the company, where they were received by Mr. J. T. Moore and other officials.

Delegates from Russia: Mr. F. P. Romadin, Mr. P. Siry and Mrs. Modin. The delegation was led by Prof. V. A. Golubstov, who made a statement at the atomic energy session



Prof. H. Melan, Austria, opening the discussion on the subject of gas-turbines and jet engines

The Chester works of Brookhirst Switchgear, Ltd., were visited by a number of delegates on 19th July; Mr. H. H. Brown (B.E.A., Liverpool) was in charge of the party. Luncheon was taken at the Grosvenor Hotel, Chester, the Mayor and civic officials being present. Later the visitors were entertained at tea at the Town Hall.

A visit was also paid by Conference delegates to the Hollinwood factories of Ferranti, Ltd.

During their tour of works and collieries in the Manchester area, a number of delegates went on 17th July to the Kearsley power station, arrangements having been made for the visit by Mr. C. T. S. Arnett, controller, North Western Division, B.E.A. In the evening a dinner was held in their honour at the Midland Hotel, Manchester, when the speakers included Dr. Kamo, of Hosei University, Japan. On the following day the party went to the Bradford Colliery and then went through the tunnel connecting the colliery with the Stuart Street generating station.

Pulverized Fuel

A 40-MINUTE sound film which was recently shown in London by Babcock & Wilcox, Ltd., describes the principles of pulverized fuel firing and their application to water tube boilers. Animated diagrams show various designs of furnaces burning coals with widely differing characteristics, but correlated to the basic principles of the three "t's"—time, temperature and turbulence. This is followed by scenes at a large modern power station, where an actual installation is examined in detail. In conclusion, a reminder is given of the progressive research which is being made into the efficient combustion of fuel and new developments are forecast. This film is available on loan free of charge in either 35 mm or 16 mm sizes as also are two previous productions of the company, "Combustion and the Chain Grate Stoker," and "Steam."

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Quarry Cables

IN reply to Mr. V. G. Button's letter (21st July), cables with steel tape armouring are unsuitable for quarry use because they do not comply with Reg. 9(1) Quarries General Regulations (Electricity), 1938, regarding percentage conductivity, the reason being that the combined conductance of the steel tape and the lead sheath is less than half of the conductance of the largest conductor.

On comparing steel tape armour with steel wire armour, it will be seen that the length of tape is much greater than the length of wire because the steel tape is wound around the cable with a much shorter pitch. The fact that the edges of the steel tape may be in contact does not increase the conductance to any useful extent.

Therefore, the higher percentage conductivity of wire armoured cable makes it more suitable for quarry use than steel tape armoured cable, which, if installed, would require an earthing conductor run in parallel with the armour in order to increase the conductivity to the value laid down in the regulations.

Formby, Lancs. D. E. SMITH.

Incentive Schemes

WITH reference to your editorial on "Incentive Schemes" (14th July issue), payment by results on large electrical installation contracts would lead to bad and shoddy work and numerous disputes between operatives and management.

Often it is not possible to complete an operation on a large site, due to construction delay which requires a return to the particular job and necessitates partly going over work already done. A system of "payment by results" could be applied to, say, housing estate work where there is constant repetition, but would this not tend to increase overhead costs and involve employment of quantity surveyors with experience of pricing labour operations for calculation of bonus earned?

An electrical installation cannot be carried out on a "piece work" basis in a modern building if it is to stand the test of time. Many of the finest firms of electrical contractors in this country have built their reputations on high-class work, with skilled craftsmen who could not and would not work on an incentive basis.

One's mind goes back to the war years when the construction of camps, ordnance factories and similar projects was carried out on an incentive basis, with what result? Bad work, constant bickering and the employment of hoards of officials. No, leave the electrical contracting industry alone as regards incentive schemes. Let us devote ourselves to pursuing the question of registration of operatives, to ensure that every craftsman is a highly skilled workman and registered as such, and to the training of apprentices to follow the skilled man of to-day.

W. J. MANN.

Huyton, nr. Liverpool.

Sao Paulo Electrification

ON 20th July, electric traction was officially inaugurated on the section of the Estrada de Ferro Santos a Jundiai between Mocca and Jundiai, among those present being the Brazilian Minister of Transport and Public Works, General Joao Valdetaro de Amorim Lima, and the Administrator of the Railway, Dr. Renato de Azevedo Feio. The British Ambassador to Brazil was represented by the British Consul General at Sao Paulo.

The railway electrification contract, which is worth approximately £2 million, was secured by the English Electric Co., Ltd., in September, 1946, the route length of main line to be electrified being approximately 40 miles. Details of the scheme were published in the *Electrical Review* of 4th November last year.

M-V SUMMER SCHOOL

Five-day Refresher Courses for Teachers

TO everyone associated in any way with the generation of electricity, and consequently concerned with its use as an industrial aid, the attraction of the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd., is similar to the appeal of a great exhibition. There is no implication of ostentatious parade in that phrase; rather is it intended to mean the display to the several hundreds of trade and engineering emissaries who every year profitably tour different parts of this factory site, a place where twenty thousand men and women are organized to provide by furthering electrical development the means of bettering the standard of human life.

The construction of the famous "D" aisle, which is 900ft long and 60ft high to the eaves, one of eight in the main building, was an unprecedented undertaking at the time. Its erection in 1901 by George Westinghouse was an act of faith which has been fully substantiated by site expansion during the intervening half-century to occupy 148 acres and a shop floor area of 3,010,000 sq ft, with 2,247,000 sq ft of roof coverage.

Technical Training

Not less far-seeing were this company's pupil apprenticeship policy and later the leading part it has played in the provision of post-graduate training for young engineers recruited in progressively increasing numbers from academic centres into industry.

One recalls, too, the "summer school" of 1928 at Trafford Park—the first of its kind in this country—and the second, held in 1936, both of which aimed "to bring together for their mutual benefit those responsible for the technical training of the young engineer and those responsible for his practical training and future employment." It is this combination of objects which is believed to endow the enterprise with real value.

The main purpose of these "schools" is co-operation of the manufacturer with the teacher. Illustrated lectures by the company's directors and heads of departments outlining developments in industrial research, design and manufacture are followed by detailed inspection of workshops and laboratories prior to joint discussion of ways and means of correlating the academic and practical training of engineering students. Alternative courses are conducted in mechanical engineering, heavy and light electrical engineering, as well as for officials who direct education and careers.

That the time occupied by refresher courses of this kind is spent to mutual advantage was made evident by the sustained interest shown in the 33 lectures delivered during the five-day third Summer School at Trafford Park last week. The 260 guests welcomed by the M-V Company upon this occasion included representatives of eleven Universities in Canada, all Universities and University Colleges in England, Scotland, Wales and Ireland, many technical colleges, schools and county education authorities, the Ministry of Education, Admiralty, War Office, Air Ministry and the Institution of Electrical Engineers.

At the concluding dinner the toast of "Our Guests" was proposed by Sir Arthur P. M. Fleming, director of research and education. Dr. E. B. Moullin, Professor of Electrical Engineering at Cambridge and President of the I.E.E., and Prof. G. A. Wallace, McGill University, Montreal, responded.

The toast of "The Young Engineer," proposed by Air Marshal Sir R. Victor Goddard, Member of the Air Council for Technical Services, was acknowledged by Mr. V. N. N. Pougnet, chairman of the College and School Section of the M-V Apprentice Association.

The toast of "The Company" was proposed by Mr. F. Bray, Under-Secretary for Further Education, Ministry of Education, and responded to by Mr. E. W. Steele, director and general manager of the M-V works.

Institute of Directors

WE have received from the Institute of Directors, 51, Palace Street, Westminster, S.W.1, a list of directors of electrical companies who have recently been elected fellows of the Institute. It is stated that the organization "represents directors in their corporate capacity and unites them in a powerful body to defend their common interests as champions of private enterprise." The chairman is Maj.-Gen. Sir Edward L. Spears and the vice-chairman Sir Robert Renwick, Bt.

ELECTRICITY SUPPLY

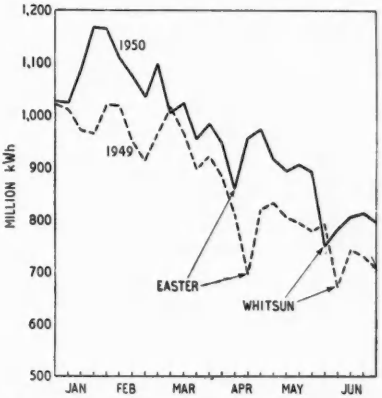
Plant Additions in First Half of Year

Cable Tunnelling in London

At the end of last year the installed capacity (m.c.r.) of generating stations controlled by the British Electricity Authority, North of Scotland Hydro-Electric Board and the Lochaber Power Co., was 13,913,000 kW. In the first six months of the year, according to statistics now issued by the Ministry of Fuel and Power, this has been raised to 14,305,000 kW, representing a net addition of 392,000 kW. During the month of June there was an increase of 62,000 kW. Two 30,000 kW sets were commissioned, one of B.T.H. manufacture at Walsall, and a Parsons set at Rotherham. Seven boilers were also put into operation last month, as follows:—

Ferrybridge, Mitchell 180,000 lb/hr; Littlebrook "B," International Combustion 265,000 lb/hr; Nottingham, International Combustion 320,000 lb/hr; Stourport "B," Stirling 525,000 lb/hr; Dunston "B," Babcock & Wilcox 400,000 lb/hr; Staythorpe, B. & W. 240,000 lb/hr; and Walsall, B. & W. 180,000 lb/hr.

During the first six months of the year 27,194 million kWh was generated, an increase of 2,517 million kWh (10.2 per cent) compared with the first half of last year.



Weekly output of solid-fuel fired stations during the first six months of 1949 and 1950

Cable-laying in London

In the course of a 7½-mile 132 kV cable-laying contract recently started by Pirelli-General Cable Works, Ltd., for the British Electricity Authority, there are no fewer than eleven major roads to be crossed in the heart of east and north-east industrial London. There are also four canal and river crossings and four railway crossings —over and under. Some of the eleven major roads will be crossed with no interruption to traffic by means of specially mined tunnels ten to twenty feet below the

	Fuel Consumed Thousand Tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	2,171	3.7	3,649	12	3,673	3,454	13,926
North of Scotland	13	0.9	16	67	86	85	379
Total for June, 1950	2,184	4.6	3,665	79	3,759	3,539	14,305
Corresponding total for June, 1949	2,019	2.9	3,308	72	3,394	3,192	13,439
Increase per cent	+ 8.2	+ 58.6	+ 10.8	+ 9.7	+ 10.8	+ 10.9	+ 6.4
Total for six months	15,747	34.0	26,437	645	27,194	25,671	—
Corresponding total for 1949 ...	14,566	25.5	23,929	649	24,677	23,286	—
Increase or decrease per cent ...	+ 8.1	+ 33.3	+ 10.5	− 0.6	+ 10.2	+ 10.2	—

* The total includes generation by oil engines (6.4 million kWh, in June, 1950), refuse destructors (0.1 million kWh) and waste heat plants (9.2 million kWh).

surface. The first of these was under the East India Dock Road, where, working from each side, two miners and their gangs have broken through. Their work has not been altogether pleasant; it has been very hot underground, the clay has been full of water (pumping has been continuous) and the heading has not left a great deal of room for manœuvre, the tunnel being 5ft square. The contract will take eighteen months to complete and will mean more power for London from the new East India Dock, Brunswick Wharf power station.

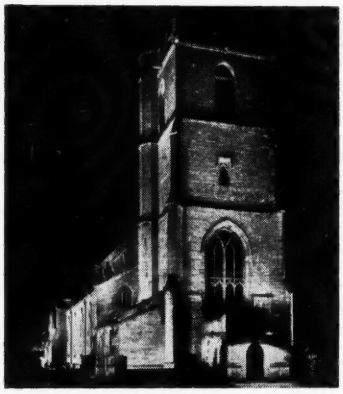
Lakeland Link

It is reported that the British Electricity authority has met some of the objections to its proposal to erect a 132 kV line from Sellafield round the coastal fringe of the Lake District to Barrow-in-Furness, where the new Roosecote station is to be erected. Originally it was proposed to take part of the line over the fells, but now the B.E.A. has agreed to follow a coastal route, after a diversion through the Whicham Valley to Silecroft, and to carry the line on the seaward side of the railway between Silecroft and Bootle. The Planning Committee has agreed that it would be difficult to find a point for the crossing of the River Esk which would interfere less with amenities than the position suggested by the B.E.A.

Rural Supplies

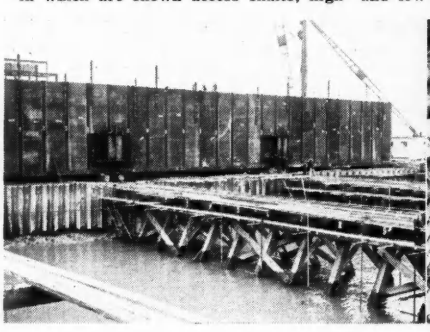
At a meeting at Newcastle-on-Tyne of the North Eastern Electricity Consultative Council it was reported that the Electricity Board had plans for supplying another 70 villages and 220 farms in the district. This will comprise stage 2 of the Board's rural development plan, but the Board gave a warning that the carrying out of this scheme was dependent upon the availability of capital funds and the technical and engineering factors involved in extending the present high voltage system. The Electricity Board reported that during the past quarter it had approved estimates amounting to £603,194, covering 141 schemes. Eighty-five new substations had been put into operation, and in addition high-voltage supplies were afforded to 19 industrial consumers. Ninety-three farms were connected compared with 48 in the corresponding period of last year.

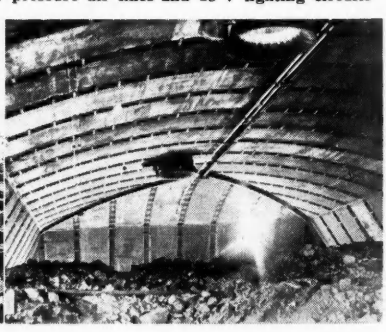
An electricity supply was recently officially switched on at Greinton, Somerset.



Wareham Abbey floodlit during the Bishop of Salisbury's annual tour of his diocese. Equipment loaned by the General Electric Co., Ltd., was installed by Aish & Co., Ltd., Bournemouth

A pneumatic caisson, believed to be the largest in the world, is being sunk in the River Usk in connection with the construction of the circulating-water pumping station for the proposed Uskmouth generating station (see last week's issue). Left: North face of caisson cutting edge and working chamber roof before rolling out. Right: View under working chamber roof of one compartment in which are shown access shafts, high- and low-pressure air lines and 25 V lighting circuits





Mr. L. V. Turner, manager of the Taunton Sub-Area of the South Western Electricity Board, and Mr. H. G. B. Dickinson, manager of the Bridgwater District, were present.

I.o.M. Controversy

The existing arrangements for electricity generation in the Isle of Man were again discussed during a recent debate in the Tynwald. The matter arose out of an application by the I.o.M. Electricity Board for a vote of £7,940 to cover the first part of a £29,585 scheme for laying cables underground. Mr. J. Nivison suggested that the Court should appoint a Commission to examine the whole question of generation and distribution throughout the Island as he considered that there was no need for two electricity authorities. This met with the support of Mr. T. C. Cowin, who thought it foolish that there should be two generating stations in such a small place. The whole thing arose through a clash of personalities, he said, and it was scandalous that it had been allowed to develop in the way it did. With regard to the vote for laying underground cables, Mr. J. B. Bolton contended that the method of financing this work was wrong; the Board should do it by borrowing. He moved an amendment that the amount should be reduced to £3,860, and this was carried.

Alternator Rotor Construction

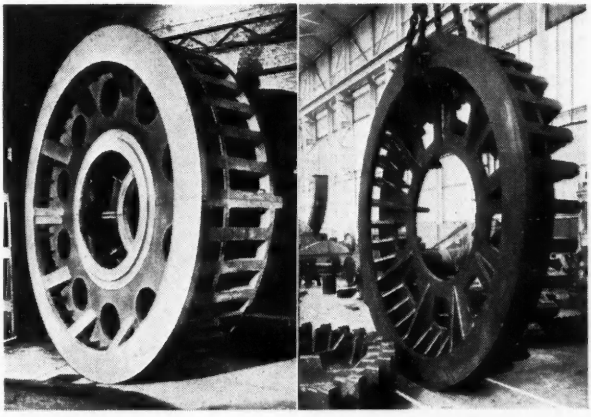
Use of Steel Castings

A NOTEWORTHY example of the practicality of replacing fabricated structures by steel castings is the production by David Brown-Jackson, Ltd., of a 28-ton rotor for service in a 20,000 kVA water-driven turbo-alternator in New Zealand. These large rotors are normally fabricated, using many hundred components in the process, but the company formed the opinion that casting in steel could offer commercial as well as technical advantages.

In the first attempt the rotor disc was cast in four sections. Two of them were then welded together to form each half of the rotor, and the halves bolted together gave the completed rotor casting. Obviously, casting enabled the ready incorporation of swells to accommodate the machining of the slots for the rotor windings, while maintaining the lightness of the structure as a whole.

As was expected, the projecting vanes from the flat disc-like surface resulted in small tears at the junction of the vanes and the disc surfaces, and in the interests of soundness rigid inspection was ordered, necessitating the grinding of all fillets, rooting to the base of even the slightest tears and the application of crack detection and gamma-ray detection.

The experience gained as a result of this trial casting supported the view that an even more satisfactory job could be obtained by casting in only two parts and welding them together. This has since been done with very good results. Radiographs were taken, and these demonstrated the physical superiority of the casting as compared with the normal fabricated structure, and pointed to the inherent strength of the casting arising from its homogeneity.



Left : The completed rotor built up from four cast parts

Right : Two such castings are welded together to form the rotor

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

The Dubilier Condenser Co. (1925), Ltd., reports a trading profit for the year ended 31st March last of £151,401, as compared with £130,466 for the preceding year, and after meeting all charges, including £61,700 for taxation, there is a net profit of £64,194 (against £43,586). It is proposed to place £50,898 to general reserve and to pay an unchanged ordinary dividend of 20 per cent, for the year, leaving £82,620 to be carried forward (against £83,291 brought in).

It is proposed to capitalize £46,181, being £42,103 standing to the credit of E.P.T. refund suspense account, and £4,078 standing to the credit of the share premium account, to be applied in paying up in full 923,625 ordinary shares of 1s each, to be allotted to ordinary holders in the proportion of three new shares for every five shares held.

Parmiter, Hope & Sugden, Ltd., report a net profit for the year ended 31st March, after deducting £60,876 for taxation, of £59,276, as compared with £53,175 for 1948-49. It is proposed to pay an ordinary dividend for the year of 25 per cent on capital increased by a 90 per cent capital bonus issue. In the previous year the ordinary dividend was 30 per cent, plus a jubilee bonus of 20 per cent. The balance carried forward is £63,477 (against £62,412 brought in).

The Pirelli-General Cable Works, Ltd., reports a net profit for the year to 31st March last of £1,291,290, as compared with £1,031,469 for 1948-9. Taxation absorbs £714,398, reserve for tax deferred by initial allowances receives £13,650 and general reserve £250,000. The dividend for the year is 8 per cent, plus a bonus of 12 per cent, again making 20 per cent for the year. The balance carried forward is £639,508 (against £436,266 brought in).

Ruston & Hornsby, Ltd., report a group net profit for the year ended 31st March last of £844,017, as compared with £976,643 for 1948-49. The net profit attributable to members of the holding company is £842,321 (against £976,351), and after deducting retentions in reserves of subsidiaries, the net balance to be dealt with in the accounts of the parent company is £675,461 (against £717,178) to which are added sundry provisions no longer required of £16,540. After making allocations to various reserves it is proposed to pay an ordinary dividend for the year of 7½ per cent, less tax, on capital increased by a 100 per cent share bonus. The dividend on the old capital last year was 12½ per cent. The balance carried forward is £194,617 (against £184,665 brought in).

George Kent, Ltd., report a group profit for the year ended 31st March last of £186,537, as compared with £126,615 for the preceding year. The parent company's profit, after providing for taxation, is £172,708 (against £119,842). The dividend for the year is maintained at 10 per cent by a final payment of 7 per cent.

Veritys, Ltd., report a trading profit for 1949 of £20,674, as compared with £42,337 for 1948, and a net profit of £4,036 (against £13,689). General reserve receives £5,000 and the dividend for the year is 2½ per cent (against 5 per cent). The balance carried forward is £14,994 (against £16,933 brought in).

Thomas De La Rue & Co., Ltd., report a group profit, after all charges, including taxation, of £347,909, for the year ended 1st April last, as compared with £315,651 for the previous year, and the amount attributable to members of the holding company is £347,770 (against £313,183). The final ordinary dividend is 35 per cent, again making 50 per cent for the year.

The Lancashire Dynamo & Crypto, Ltd., proposes to offer to ordinary stockholders 83,476 ordinary shares of £1 each at 80s per share in the ratio of one new share for every £6 of ordinary stock or six ordinary shares held. The consent of the Capital Issues Committee has been applied for.

Richardsons, Westgarth & Co., Ltd., report a net profit for the year ended 31st March last of £279,438, as compared with £169,303 for the preceding year. It is proposed to pay a dividend for the year of 12 per cent, less tax (against 10 per cent).

Metal Industries, Ltd.—The group profit, after depreciation, for the year ended 31st March amounted to £922,835 (£891,542). This included the figures for the new subsidiary, Cox & Danks, Ltd. The provision for U.K. taxation, after deduction of previous over provision of £76,370, is £441,880 (£466,693) and the net profit amounts to £476,218 (£409,500). The general reserve is brought up to £500,000 by the addition

of £188,729 (nil), while subsidiary companies' stock reserve receives £100,000 (nil). A final dividend of 7 per cent brings the total distribution to 10 per cent (same) and £322,777 (£333,002) is carried forward.

Electrical Switchgear & Associated Manufacturers, Ltd.—The consolidated accounts for the year ended 31st March record a trading profit of subsidiary (Brookhirst Switchgear, Ltd.) £177,036 (£157,480), and other income £820 (£630), making £177,856 (£158,110). After providing for depreciation £19,781 (£12,260), subsidiary company directors' service remuneration and administrative charges £14,718 (£17,037), stock valuation reserve £15,000 (same) and interest on loan from Metal Industries £4,257 (£3,237), the consolidated profit was £123,909 (£110,385). U.K. tax requires £76,837 (£65,000), less £22,730 (£4,604) management expenses claim and overprovision, and directors' fees £700 (£600), leaving a consolidated net profit of £69,102 (£49,389). A sum of £67,570 (£66,678) is brought in, making available £136,672 (£116,067). Preference dividend takes £3,162 (same) and ordinary dividend £65,940 (£45,335), leaving profit retained—Electrical Switchgear £20,000, subsidiary £47,570. The consolidated current assets are £729,606 (£750,136) and current liabilities £174,489 (£238,501).

Newman & Watson, Ltd., report that the net profit of the group for the year ended 31st March was £32,046 (£34,274) after taxation. Income tax and profits tax amounted to £41,570 (£41,800). It is proposed to increase the ordinary dividend from 7½ to 10 per cent.

Murex, Ltd., proposes to pay a final dividend of 6 per cent, making 10 per cent for the year. Taking into consideration the doubling of the ordinary capital by capitalization of £1,000,000 of reserves, the dividend recommended is equivalent to the 20 per cent paid in the previous year.

Mather & Platt, Ltd., have declared an unchanged interim dividend of 4 per cent.

Donald Macpherson & Co., Ltd., are maintaining their interim dividend at 25 per cent.

INCREASES OF CAPITAL

A. C. Scott & Co., Ltd.—Increased by £10,000, in 5s shares, beyond the registered capital of £10,000.

Magnatex, Ltd.—Increased by £140,000, in £1 7½ per cent redeemable cumulative preference shares, beyond the registered capital of £100.

Lighting, Heating & Traction Supplies Co., Ltd.—Increased by £2,500, in £1 ordinary shares, beyond the registered capital of £2,500.

RECEIVER APPOINTED

George, Forrest & Son, Ltd.—A. E. Spicer, 19, Fenchurch Street, E.C.3, was appointed receiver and manager on 16th July, under powers contained in debenture dated 9th June, 1950.

LIQUIDATIONS

Thomas Duncan, Ltd.—Winding up voluntarily. Liquidator, Mr. P. Phillips, 76, New Cavendish Street, London, W.1.

Volta Electric, Ltd.—Winding up voluntarily. Liquidator, Mr. E. D. Basden, 73, Basinghall Street, London, E.C.2.

W. R. Pratt (Refrigeration), Ltd.—Meeting of creditors, 23rd August, at the offices of Singleton, Fabian & Co., Ltd., 30, Southampton Buildings, Chancery Lane. London, W.C.2, to receive an account of the winding-up by the liquidator, Mr. P. L. Eynon.

A. W. F. Radio Products, Ltd., Commerce House, Cheapside, Bradford.—Winding up voluntarily. Liquidator, Mr. E. Eastwood, of A. E. Ellison & Co., Commerce House, Cheapside, Bradford.

BANKRUPTCIES

L. W. Aldis, electrical engineering contractor, Greengates, Top Street, Rattlesden, and previously Lyndhurst Cottage, Woolpit, both Suffolk.—Receiving order made 17th July on debtor's own petition.

A. Jacobs, electrical engineer, 312, London Road, Westcliff-on-Sea.—Receiving order made 11th July on debtor's own petition. First meeting 31st July, at 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1. Public examination, 12th October, at the Petty Sessions House, Alexandra Street, Southend.

C. L. Philpott, 55, High Street, Walton-on-Naze, Essex, radio and electrical dealer.—Trustee, Mr. A. W. Hunter, 185-188, High Holborn, London, W.C.1, appointed 6th July.

C. S. Lewis, electrical contractor and retailer, 347, Eastern Ave., Ilford.—Application for discharge to be heard 18th September, at the Shire Hall, Chelmsford.

A. H. Smith, electrical engineer, lately carrying on business at 62-64, Lower Sloane Street, London, S.W.1.—First and final dividend of 5¾d in the £, payable 11th August at the offices of T. J. M. Macleod, 4, Bucklersbury, London, E.C.4.

C. J. Baldwin, electrical fitter, 212, Barton Road, Stretford (amended notice).—First and final dividend of 5s 7d in the £, payable 28th July at Official Receiver's office, 20, Byrom Street, Manchester.

FINANCIAL SECTION

STOCKS and SHARES

ADDED to the uncertainty surrounding the Korean war news, Stock Exchange markets are already under the influence of the impending holiday season, which, even in ordinary times, has the effect of laying restraint upon activity and of drying up the springs of enterprise. Sentiment round the markets is liable to change abruptly, according to the character of the news. When there is little of encouragement to support prices, the disposition naturally is for them to ease off under their own weight.

Rises and Falls

Changes in prices since a week ago are somewhat irregular. The radio group is dull; E. K. Cole are easier at 15s 4d. Elsewhere, International "Tel. & Tel." recovered a point, to 21. Tube Investments at 6.1/16 are the fractjon better. Ward & Goldstone strengthened to 35s 6d. Globe Telegraphs, 47s, and Telephone Properties, 21s 6d, are up on the week. Scophony Baird are 6d higher at a florin. Veritys fell to 3s on the dividend reduction, from 5 per cent to 2½ per cent. Babcock & Wilcox, 63s 6d, and Vickers, 30s 3d, have again advanced. Declines have occurred in Falk Stadelmann, 35s, Murex, 45s, and Crompton Parkinson, 11s 6d.

De La Rue 5s shares had a brief rise to 24s 6d on the declaration of a final dividend again, making 50 per cent for the year, but came back to 23s 9d, after consideration of the necessarily complicated preliminary profits statement. Brush Electrical new 5s shares remain at a small premium on the par price at which they were offered.

Company News

The full accounts of Pye, Ltd., disclose an expansion of more than 50 per cent in the consolidated trading profit, which comes out just short of half-a-million. After taxation and all charges, the surplus is practically four times the net amount required to pay the increased dividend of 35 per cent. The report gives a full explanation of dividend policy, and of the manner in which it is linked to the employees' profit-sharing scheme. At 31s 3d, the 5s deferred shares yield £5 12s per cent. Dubilier Condenser's accounts also show the dividend of 20 per cent in a conservative light. At 3s 3d, the 1s shares return £6 3s per cent. Richardsons Westgarth 5s shares rose from 7s 3d to 8s 6d on the 12 per cent dividend, which gives shareholders an additional 2 per cent from a 65 per cent increase in the net profit.

Lancashire Dynamo Capital

From all accounts, the outbreak of the Korean trouble dammed up a spate of capital issues for the industrial market. Report after report speaks nowadays of the way in which taxation is disabling industry from providing, out of internal resources, the working capital necessary to finance and expand business at the inflated levels prevailing. Such issues as have braved market conditions in the past month have mostly taken the form of debenture and preference stocks, or short-term notes. Lancashire Dynamo & Crypto are among the first, since the Korean outbreak to propose an issue of ordinary shares. Subject to Treasury consent, shareholders are to be offered new £1 shares on a one-for-six basis at £4, which is 17s 6d below the market price of the existing shares.

Lodge Plugs Results

Introduced to the public for the first time early last year, Lodge Plugs 5s ordinary shares have been a good market this past week on the strength of a £50,000 increase (before tax) in the trading profits just announced for 1949, and a comparatively restrained rise in the dividend rate to 35 per cent. Last year's distribution was 30 per cent, with the addition of a special payment from capital profits. The extra 5 per cent will take less than £7,000 net and the total appears to be covered by earnings equal to approximately 60 per cent. After rising 1s to 25s ex-dividend, the shares now pay a useful 7 per cent on the money.

Prices and Yields

The following shows the current position, based on official Stock Exchange quotations, of some of the less active shares with electrical associations:—

Ordinary Share	Price	Div. %	Yield %
	s d		
Barton & Sons (5s.) ...	6 6	10	7.7
Dubilier Condenser (1s) ...	3 6	20	5.7
Newton Bros. (2s) ...	3 0	25	—
	(+Cap. bon. 100%)		
Parmiter Hope (1s) ...	3 0	30	—
	(+ Cap. bon. 50% and Cash bon. 20%)		
Sun Electrical (£1) ...	22 6	7½	6.7
Taylor Tunnicliff (5s) ...	15 0	15	5.0
Aerialite (1s)	7 0	150	—
	(+ Cap. bon. 87½%)		
Brit. Elec. Resistance (2s)	4 0	20	10.0
Reliance Clifton (5s) ...	18 9	25	6.7
Dewhurst (2s)	9 6	30	6.3

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

17344. Schindler, W.—Photo-electric devices for controlling the operation of machine tools. 21st October, 1943. (642401.)

1944

21166. British Thomson-Houston Co., Ltd.—Coiled filaments for electric lamps and discharge devices and methods of making the same. 30th October, 1944. (642521.)

1945

18495. Dean, T. F.—Reflectors for lamps or lighting. 18th July, 1946. (642643.)

1946

1827. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Long distance telecommunication systems. 17th January, 1947. (642524.)

7404. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Toll telecommunication switching systems. 26th March, 1947. (642526.)

7405. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Telecommunication switching systems. 3rd April, 1947. (642527.)

7406. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Telecommunication systems. 28th March, 1947. (642528.)

15413. Wayne Kerr Laboratories, Ltd., Jackson Automatic Electric Controls, Ltd., and Robinson, R. S. —Radio remote control systems for use on vehicles. 21st May, 1947. (642461.)

16998. Will's Patents, Ltd., and Will C.—Signalling device for indicator call systems. 20th December, 1946. (642532.)

20238. Standard Telephones & Cables, Ltd.—Light intensity filter system for cathode-ray tube devices. 6th July, 1946. (Cognate application 20239, 14th July, 1945.) (642533.)

26881. Triggs, W. W. (Electric Machinery Mfg. Co.). —Voltage regulators. 6th September, 1946. (642535.)

33228. Budd Co.—Electrical control systems. 8th November, 1946. (642468.)

34380. Mallory Metallurgical Products, Ltd.—Manufacture of electrical contacts. 20th November, 1946. (642648.)

35606. Gulf Research & Development Co.—Apparatus for measuring the values of magnetic fields. 2nd December, 1946. (642649.)

35607. Gulf Research & Development Co.—Apparatus for responding to magnetic fields. 2nd December, 1946. (642650.)

1947

1631. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Alternating current signalling equipment. 17th January, 1947. (Divided out of 642524.) (642538.)

5231. White, E. L. C., and Nind, E. A.—Arrangements for stabilizing the amplitude of electrical oscillations. 13th January, 1948. (642655.)

5896. British Tabulating Machine Co., Ltd.—Thermionic valve commutators or the like. 28th February, 1947. (642656.)

6696. Radio Corporation of America.—Ultra short wave radio communication systems. 10th March, 1947. (642657.)

7092. Automatic Electric Laboratories, Inc.—Automatic switches suitable for use in telephone or like systems. 14th March, 1947. (642586.)

7990. Standard Telephones & Cables, Ltd., Baguley, E., Gent, A. W., Barnes, F. D., and Gretton, T. F.—Joints or terminations for high-frequency electric cables. 19th March, 1948. (642540.)

9407. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Telecommunication exchanges and to operators' switchboards therefor. 9th April, 1947. (Divided out of 642527.) (642541.)

9408. Standard Telephones & Cables, Ltd., and Wright, E. P. G.—Long distance telephone exchange systems. 9th April, 1947. (Divided out of 642527.) (642542.)

10112. Soc. Anon. des Ateliers de Secheron.—Gear case supporting means for the axle-driving gear of electric rail vehicles. 16th April, 1947. (642659.)

11738. Naamlooze Vennootschap Onderzoekingsinstituut Research.—Treatment of spinning-cakes, bobbins or like packages formed from artificial threads by dielectric heating. 1st May, 1947. (642662.)

11914. Bakovenbouw Voorheen H. P. Den Boer N. V.—Electric ovens. 2nd May, 1947. (642408.)

15996. Bendix Aviation Corporation.—Automatic voltage regulating systems. 17th June, 1947. (642411.)

16402. Goward, F. K., and Dain, J.—Electromagnetic induction accelerators and like devices. 12th July, 1948 (642667.)

17196. British Thomson-Houston Co., Ltd., Stanworth, J. E., and Redston, G. D.—Glass-to-metal seals and alloys therefor. 9th Dec., 1948. (642668.)

18708. Patelhold Patentverwertungs- & Elektroholding Akt.-Ges.—Tube generators with oscillation crystals. 14th July, 1947. (642599.)

19974. Philips Lamps, Ltd.—Methods of providing a foil on a luminescent surface. 24th July, 1947. (642416.)

20132. Western Electric Co., Inc.—Voltage regulators. 25th July, 1947. (642673.)

20133. Western Electric Co., Inc.—Electron discharge apparatus. 25th July, 1947. (642600.)

21457. Furzehill Laboratories, Ltd., Smith & Sons (England), Ltd., S., and Milsom, F. R.—Electric integrating circuits. 6th Aug., 1948. (642471.)

21823. Electroflo Meters Co., Ltd.—Pressure responsive indicating instruments. 8th Aug., 1947. (642677.)

21848. Polytechnic Institute of Brooklyn.—Variable attenuators for high-frequency currents. 8th Aug., 1947. (642418.)

22239. Williams, F. C., Noble, S. W., and Baxandall, P. J.—Oscillators. 13th Aug., 1948. (642679.)

26929. Westinghouse Electric International Co.—Control systems for electric elevators. 7th Oct., 1947. (642685.)

28358. Philips Electrical, Ltd.—Optical systems for television receivers. 23rd Oct., 1947. (642429.)

30006. English Electric Co., Ltd., Buckley, F., and Treble, A. G.—Moulding of castings. 9th Nov., 1948. (642546.)

30143. Steensen, S. J.—Magnetic clutches. 12th Nov., 1947. (642433.)

30470. British Thomson-Houston Co., Ltd.—Electric-discharge devices. 17th Nov., 1947. (642434.)

30933. Standard Telephones & Cables, Ltd., Prior, H. T., and Fisher, T. W.—Electric wave filters. 19th Nov., 1948. ((642691.)

32574.—Weber, M.—Electric alarm clocks. 10th Dec., 1947. (642440.)

32646. Wicks, G. C.—Electric liquid flow heaters. 11th Dec., 1947. (642547.)

33622. Standard Telephones & Cables, Ltd.—Method of injecting local oscillator signal into mixer. 19th Dec., 1947. (642549.)

33689. Anglo American Corporation of South Africa, Ltd.—Wound rotor induction motors and processes of dealing with surplus energy generated therein. 19th Dec., 1947. (642443.)

33798. Standard Telephones and Cables, Ltd.—Manufacture of vitreous envelopes. 22nd Dec., 1947. (642444.)

34657. Moravian Electrical Engineering Works, National Corporation, and Klima, V.—Circuit connection for the compensation of shunt multiphase commutator machines. 30th Dec., 1947. (642447.)

35067. Moravian Electrical Engineering Works, National Corporation, and Klima, V.—Arrangement for the phase compensation of shunt commutator motors. 31st Dec., 1947. (642448.)

1948

301. Metropolitan-Vickers Electrical Co., Ltd., and Turnbull, J. S.—Casting of metals. 4th Jan, 1949. (642608.)

945. Sprague Electric Co.—Electrical condensers. 12th, January, 1948. (642609.)

1318 & 1319. British Thomson-Houston Co., Ltd.—Magnetic cores. 15th January, 1948. (642450/1.)

1939. Westinghouse Brake & Signal Co., Ltd., and Walker, A. H. B.—Voltage regulating apparatus for alternating electric current circuits. 2nd December, 1948. (642452.)

2854. British Thomson-Houston Co., Ltd.—Pick-ups of the variable resistance type. 30th January, 1948. (642614.)

3500. English Electric Co., Ltd., Shaw, N. H., and Bennett, J. H.—Excitation control systems for d.c. dynamo-electric machines. 4th February, 1949. (642695.)

5648. Metropolitan-Vickers Electrical Co., Ltd.—Single-phase synchronous motors. 25th February, 1948. (642476.)

5705. Wayne Kerr Laboratories, Ltd., and Calvert, R.—Construction of high-frequency bridges. 25th February, 1949. (642617.)

6072. Western Electric Co., Inc.—Telephone systems. 27th February, 1948. (642455.)

6127. Metropolitan-Vickers Electrical Co., Ltd.—Self-starting synchronous motors. 27th February, 1948. (642477.)

6721. Landis & Gyr Soc. Anon.—Receiving device for electric switching operations in remote control installations. 3rd March, 1948. (642479.)

9198. Blake, K.—Interference suppression systems for radio receivers and the like. 1st April, 1948. (642696.)

9307. Standard Telephones & Cables, Ltd.—Frequency modulation of electric oscillation generators. 2nd April, 1948. (642560.)

11332. Crabtree & Co., Ltd., J. A., Besag, E., and Wintle, T. D. G.—Moving contacts of electromagnetic switches. 5th January, 1949. (642622.)

12247. Clark, H., and Bickell, S. F.—Tubular electric heating elements. 4th May, 1949. (642563.)

12640. Eckett, S. W.—Electrical heating elements. 6th May, 1949. (642625.)

14080/1.—Babcock & Wilcox, Ltd.—Tubulous boilers. 25th May, 1948. (642566/7.)

14663. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Apparatus for interrupting the rays falling on to a light or heat sensitive cell. 31st May, 1949. (642697.)

14689. Czechoslovak Metal & Engineering Works, National Corporation, and Zajic, V.—Circuit-breaker with magnetic blow-out for alternating current. 31st May, 1948. (642628.)

15876. Rotax, Ltd., and Bourne, W. G.—Electric push-pull switches. 23rd May, 1949. (642570.)

16402. M-O Valve Co., Ltd., and Willshaw, W. E.—Magnetrons. 10th June, 1949. (Cognate application 29946, 17th November, 1948.) (642488.)

16677. Knoblauch, Sen., E.—Electrical arrangements for generating hot water and steam. 21st June, 1948. (642571.)

17048. General Electric Co., Ltd., and Dale, S. H.—Electric motor control systems. 24th June, 1949. (642490.)

18916. General Electric Co., Ltd., and Jacoby, H. C. E.—Electric motors. 17th June, 1949. (Addition to 614348.) (642494.)

19499. Westinghouse Brake & Signal Co., Ltd.—Self-checking means for apparatus for comparing the impedance of two electric circuits. 21st July, 1948. (642495.)

20700. Metropolitan-Vickers Electrical Co., Ltd.—Air cleaning and circulating apparatus. 5th August, 1948. (642496.)

20926. Standard Telephones & Cables, Ltd., Bagley, E., Gent, A. W., Barnes, F. D., and Gretton, T. F.—High-frequency electric cables. 9th August, 1948. (Addition to 642545.) (642576.)

23303. Cossor Radar, Ltd., and Levin, A.—Magnetic focusing in cathode-ray tubes. 19th August, 1949. (642504.)

25645. Victor Products (Wallsend), Ltd., and Mann, R. W.—Electric light units. 28th September, 1949. (642512.)

1949

5261. Carrier Engineering Co., Ltd.—Regulating valves, particularly applicable to thermostatically controlled air conditioning systems. 30th September, 1946. (Divided out of 642467.) (642518.)

17051. Automatic Electric Laboratories, Inc.—Automatic switches suitable for use in telephone or like systems. 14th March, 1947. (Divided out of 642586.) (642640.)

Amended Specifications

613862. Marconi's Wireless Telegraph Co., Ltd.—Very short wave radio viewing apparatus.

631127. Standard Telephones & Cables, Ltd.—Electric cables.

Lighting Improvements

MANCHESTER Corporation Highways Committee has under consideration a programme of works for new installations and for the conversion of street lighting equipment from gas to electricity. The total estimated cost is £25,230.

A £16,200 scheme for the conversion of 1,620 gas street lamps to electricity at CHESTERFIELD has received Ministry approval. A period of twelve months for carrying out the work has been suggested by the Ministry.

NEWTOWNARDS (N.I.) Council is applying to the Ministry of Health and Local Government for sanction to a loan of £22,000 for the Council's new electric lighting scheme.

NEWBIGGIN (Northumberland) U.D.C. is to carry out a £13,780 scheme for converting street lighting from gas to electricity. The scheme provides for 249 lamps. The cost will include £10,540 for lighting main and side streets and £2,860 for the promenade. The scheme is to be submitted for the approval of the Ministry of Transport.

A street lighting scheme involving 44 sodium vapour electric discharge lamps is to be put into operation by LAMESLEY (Durham) Parish Council, on the Great North Road. Tenders are being obtained.

BOOTLE Corporation Works Committee has approved a scheme for the provision of sodium lighting in Marsh Lane between Stanley Road and Irlam Road at an estimated cost of £1,209.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Argentina.—BUENOS AIRES.—10th August. Director-General of Water and Electric Power. Electrical equipment and transmission cables for the control of sluice gates at the Los Quiroga dam. (C.R.E. (I.B.) 59535/50. Ten/1459.)*

22nd August. Director-General of Water and Electric Power. Ten diesel-electric d.c. generating sets (25 to 100 kW). (C.R.E. (I.B.) 59774/50. Ten/1464/I.B.3.)

Ashford (Kent).—19th August. U.D.C. Erection of street lighting columns. (See 21st July issue.)

Australia.—QUEENSLAND.—24th August. City Electric Light Co., Ltd. 44 kV, 750 MVA outdoor-type switchgear. (C.R.E. (I.B.) 59152/50. Ten/1442.)*

31st August. 6,600 V and 415 V indoor metal-clad switchgear. (C.R.E. (I.B.) 59116/50. Ten/1445.)*

22nd September. Brisbane City Council. Various types and lengths of 11 kV and 660 V p.i.l.c. cables and jointing material. (C.R.E. (I.B.) 59978/50. Ten/1468/I.B.2.)

6th September. Queensland State Electricity Commission. Low-pressure circulating water valves. (C.R.E. (I.B.) 59115/50. Ten/1443.)*

7th September. 33 kV lead-covered cables. (C.R.E. (I.B.) 59151/50. Ten/1437.)*

VICTORIA.—27th September. State Electricity Commission. 6.6 and 22 kV distribution transformers. (See this issue.)

Belfast.—1st September. Corporation Electricity Department. Cables for first stage of 33 kV distribution system extensions. (See this issue.)

Bournemouth.—8th September. Corporation. Traffic signals. (See this issue.)

Chester-le-Street.—R.D.C. Electrical installations in 46 houses on the Lumley site, 36 houses at Ouston, and 92 at Barley Mow. F. Bowman, housing architect, Estate Office, Birtley, Co. Durham.

Egypt.—7th September. Director-General, Cairo Electricity and Gas Administration. Transformers. (See this issue.)

Gateshead.—4th August. Education Committee. Electrical installation at new technical college. (See this issue.)

Ilkley.—21st August. U.D.C. Street lighting equipment. (See this issue.)

India.—MADRAS.—16th August. Mysore Government Stores Purchase Committee. Four 300 kVA transformers. (C.R.E. (I.B.) 58649/50. Ten/1422.)*

MADRAS.—10th August. Stores Purchase Committee, Government of Mysore. Power transformers and potential transformers. (C.R.E. (I.B.) 57694/50. Ten/1446.)*

NEW DELHI.—9th September. Director-General of Industries and Supplies. Electric cranes. (C.R.E. (I.B.) 58779/50. Ten/1429.)*

Irish Republic.—DUBLIN.—30th August. Port and Docks Board. Electric cranes. (C.R.E. (I.B.) 58871/50. Ten/1428.)*

New Zealand.—3rd October. State Hydro-Electric Department. 10,000 kVA transformer bank. (C.R.E. (I.B.) 58658/50. Ten/1421.)*

21st November. Two 30,000 kVA synchronous condensers. (C.R.E. (I.B.) 58655/50. Ten/1419.)

Nuneaton.—10th August. Corporation. Street lighting columns. (See this issue.)

Preston.—Corporation. Electrical installation in Grange County Primary School. (See this issue.)

Queensbury and Shelf.—8th August. U.D.C. Sodium lighting equipment. (See 21st July issue.)

St. Albans.—21st August. R.D.C. Street lighting equipment. (See this issue.)

South Africa.—BLOEMFONTEIN.—17th October. City Council. Two stoker-fired boiler units and other plant. (C.R.E. (I.B.) 59548/50. Ten/1455.)*

Watford.—3rd August. Fluorescent street lighting equipment. (See this issue.)

ORDERS PLACED

Folkestone. — Corporation. Recommended. Electrical installations in 68 houses at Biggins Wood site (£2,070).—H. G. Cockram.

Hull.—Corporation. Electrical installations in 24 single-persons' dwellings at Pearson Park (£590) and 12 aged persons' dwelling at Boothferry Road (£327).—T. A. Garness. Fourteen houses at Parkstone Road (£494).—Booker & Tarran. Thirty-six flats at St. Paul Street (£1,297).—A. Lee.

Luton.—Corporation. Committee for Education. Electrical installation at Farley County Primary Junior School (£3,648).—Iverson Electrical Co., London.

Newcastle-upon-Tyne.—Electrical work at a large engineering block for King's College.—Watson-Norie, Ltd.

Plymouth. — Corporation. Recommended. Electrical installation at Ernesettle Primary School (£2,440).—Drake & Gorham, Ltd.

Wallasey.—Education Committee. Recommended. Electrical installation at Somerville Secondary Modern School (£4,572).—Parry's Electrical Engineers, Ltd.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashton-under-Lyne.—Orthopædic department at District Infirmary; T. Worthington & Sons, architects, 178, Oxford Road, Manchester.

Birkenhead.—Laird Street primary school; A. Monk & Co., Ltd., Padgate, Warrington.

New police headquarters (£59,000); Willink & Dod, architects, Cunard Building, Liverpool.

Factory, 48/50, Somervill Street; Pierce Williams & Son, 92, Selborne Street, Liverpool, 8.

Burnley.—Police headquarters and magistrates' courts, Cattle Market site; borough engineer.

Chelmsford.—Rebuilding Pavilion Cinema, Rainsford Road; F. J. Partner, Warwick House, Regent Street, W.1.

Block of 45 flats, Woodhall estate; A. E. Wiseman, architect, 10, Duke Street.

Cheltenham.—Factory, Alstone; Leonard Stace, Ltd., 6, Brunswick Street.

Darlington.—Houses (30), Hardwick Close, and the Haughton South estate; borough architect.

Aged people's hostel, Firth Moor estate (£25,000); borough architect.

Durham.—Central kitchen and dining room, Oxbridge Lane, Stockton (£11,000); county architect, Court Lane, Durham.

Houses (196), Sherburn, for the R.D.C.; K. G. Miller, surveyor, Byland Lodge, Durham.

Esher.—Permanent dwellings (110), Slough Farm estate, Claygate, for U.D.C.; surveyor, Council Offices, Esher, Surrey.

Eston (Yorks).—Hostel to accommodate 100 people at Normanby for Smith's Dock Co., Ltd., shipbuilders, South Bank-on-Tees.

Eton.—Houses and flats (106), Hedgerley, for R.D.C.; Sir John Brown, A. E. Henson & Partners, architects, 117, Sloane Street, S.W.1.

Evesham.—Scheme for 146 houses on 13 sites; R.D.C. surveyor, Port Street.

Felling (Co. Durham).—Houses (44) for the U.D.C.; D. W. Green, housing architect.

Gateshead.—Houses (119), Lyndhurst estate; J. Clark and Son, Ltd., builders, Seaham, Co. Durham.

Houses (18), Ventnor Gardens, for J. Rank, Ltd.; Gelder and Kitchen, architects, Alfred Gelder Street, Hull.

Houses in Huxley Crescent (10) and Barry Street (23); J. J. Hedley, builder, Oxford Street, Newcastle-on-Tyne.

Houses (82), Banky Field, for the T.C.; A. V. Clerey and Son, builders, Frederick Street, Sunderland.

Hartlepool.—Houses near Hart Road; builders (all local firms): Watt Brothers, 11 houses; Rennie and Son, 10; T. M. Stonehouse, Ltd., 6; W. W. Brazell, Ltd., 6; John Proud, Ltd., 12.

Hayle.—Secondary modern school (£92,400) for Cornwall E.C.; county architect, County Hall, Truro.

Hendon.—Factory building; Romac Industries, Ltd., The Hyde, N.W.9.

Holsworthy.—Houses (34), on eight sites, for R.D.C.; E. A. Hooper, surveyor, Council Offices, Station Road.

Ince-in-Makerfield.—Houses (30), Petticoat Lane site, for U.D.C.; J. Gaffney & Son, Whelley, Wigan.

Lancashire.—Two nursery schools, Darwen; G. Noel Hill, county architect, Preston.

London.—Sailors' home and club, Dock Street, E.1; E. B. O'Rorke, architect, 12, Cliveden Place, London, S.W.1.

FINSBURY.—Two-storey building, 161-165, Farringdon Road, for the Property & Reversionary Investment Corporation; Max Temple and Co., architects, 24, Bryanston Square, London, W.1.

Manchester. — Factory, Northenden, for Rolinx, Ltd.; Young & Purves, architects, 12, St. Anns Square, Manchester.

Three-storey flats (162), Wythenshawe estate; city architect.

Mansfield.—Bungalows (14), Birding St.; E. C. Rippon, Ltd., Mansfield.

Newark.—Rebuilding mill for Gilstrap Earp and Co., Ltd., maltsters; Gelder and Kitchen, architects, 120, Alfred Gelder Street, Hull.

Newburn-on-Tyne.—Houses (24), Mount Pleasant, Throckley; J. A. Weatherley, surveyor.

Newcastle (Staffs).—Houses (28) and maisonettes (8), Clayton Road; Joseph Jones, Ltd., Liverpool Road.

Newcastle-on-Tyne.—Factory and office, Brinkburn Street, for the United Wire Works, Ltd.; Arthur and Kirkup, architects, 13, Swinburne Street, Gateshead.

Fire stations Wingrove Road and Roman Avenue; city architect, 18, Cloth Market.

Ramsbottom.—Five blocks of flats, Garnett Street site; E. M. Richardson, U.D.C. surveyor.

Reading.—Nurses' home at Battle Hospital; Oxford Regional Hospital Board, 43, Banbury Road, Oxford.

Mid-South secondary school for boys (£186,000); H. A. Sandford, electrical consultant, 2, Gate Street, W.C.2.

Rowley Regis.—Two-storey flats (32), site off Hanover Road, Throne Road; borough surveyor, Municipal Buildings, Old Hill, Cradley Heath.

Scunthorpe.—Infants' school, Priory Lane; Betts & Newbert, Ltd., Frodingham Road.

Shardlow.—Houses (34), Blagreaves site, for R.D.C.; Pearman & Wade, 8, Autumn Grove, Chaddesden, nr. Derby.

Sheffield.—Secondary school, Ravensthorpe; J. F. Finnegan & Co., Ltd., Eccleshall Road, Sheffield, 10.

Skipton.—Houses (48), Chapel Lane site, for R.D.C.; surveyor, Granville Street.

South Shields.—Houses (60), Simonside site; L. W. Evans, Ltd., builders, Norfolk Street, Sunderland.

Stoke-on-Trent.—Houses (64), Weston Coyney area; city architect.

Wallasey.—Primary school, Mount Road; schools architect, Town Hall.

Warwick.—Houses (55); borough surveyor.